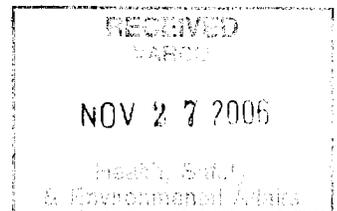


**EPA INFORMATION COLLECTION REQUEST FOR THE
OIL & GAS FIELD MACHINERY INDUSTRY (SIC 3533)**

**FORM B – SMALL FACILITIES*
TABLE OF CONTENTS**



BACKGROUND AND INSTRUCTIONS

SECTION

- 1 FACILITY INFORMATION**
- 2 WORKSHEETS**
 - TABLE 1 PRODUCTS, PROCESSES & WORK AREAS**
 - TABLE 2 MATERIAL USE**
 - TABLE 3 MATERIAL CONTENT**
 - TABLE 4 EMISSION CONTROLS**
 - TABLE 5 MATERIAL SUBSTITUTION**

APPENDIX 1 ABBREVIATIONS

APPENDIX 2 LIST OF COMMONLY USED HAZARDOUS AIR POLLUTANTS (HAP)

PLEASE WRITE YOUR FACILITY NAME AND SURVEY ID NO.* HERE:

**National Oilwell Varco
Pressure Control Group
Lockwood Plant**

OG 101

*Your Survey ID Number is on the mailing label of the envelope the survey was delivered in, and in the cover letter accompanying the survey.

Please check this box if any part of your response to this survey is considered confidential information.

* Form B is for use by facilities with less than fifty (50) employees. For facilities with fifty (50) or more employees, use Form A also included in this package

FACILITY INFORMATION- FORM B

EPA INFORMATION COLLECTION REQUEST FOR: OIL & GAS FIELD MACHINERY INDUSTRY

A. Facility Name:

National Oilwell Varco, L.P. (Lockwood Plant)

B. Facility Street Address:

1 Street	875 Lockwood Drive
2 City	Houston
3 State	Texas
4 Zip	77020
5 County	Harris

C. Mailing Address (if different from Facility Street Address):

1 Street or P.O. Box	SAME
2 City	
3 State	
4 Zip	
5 County	

D. Corporate Owner:

1 Name of Corporate Owner: National Oilwell Varco, LP.

2 City Houston

3 State Texas

4 Zip 77042

5 County Harris

6 Corporate Sales \$ 4,644.50

7 Number of corporate employees: 10,000 (Internationally)

E Facility Description:

1 Brief description of the facility (e.g., pump assembly, derrick manufacture, etc.)

Machining and Fabrication of Misc. Oilfield Equipment

2 Dun & Bradstreet No:
161681044

3 SARA TRI Facility ID (Form R): N/A

4 Number of facility employees: 44

E Facility Description: (continued)

6	SIC Code(s):	(See http://www.census.gov/epcd/www/naics.html)
	<i>Primary</i>	
	<i>Other</i>	
	<i>Other</i>	
7	NAICS Code(s):	(See http://www.census.gov/epcd/www/naics.html)
	<i>Primary</i>	333319
	<i>Other</i>	
8	Operating hours	(Most common operating hours for the majority of the year)
	Hours/day:	16-20
	Shifts/day:	2
	Days/week:	5
	Weeks/year:	26

F. Facility Diagram/Process Diagram

Attach a facility diagram or process flow diagram that includes all sources of HAP emissions. Include all activities that generate HAP emissions. Use the same terminology/codes in identifying unit operations and emissions points in this figure as you will use for the rest of this survey. (for example: Welding Room #1, Abrasive Blaster #2) This drawing may be hand drawn if none other is available.

G. Metal Fabrication Processes Conducted (*check all that apply - if needed, attach more detailed descriptions.*)

1 <input checked="" type="checkbox"/> Welding (<i>check all the apply</i>)		
		<input type="checkbox"/> Electrogas welding (EGW)
		<input type="checkbox"/> Electroslag welding (ESW)
	<input checked="" type="checkbox"/>	Flux-core arc welding (FCAW)
	<input checked="" type="checkbox"/>	Gas metal arc welding (GMAW), also called metal inert gas welding (MIG)
	<input checked="" type="checkbox"/>	Gas tungsten arc welding (GTAW), also called tungsten inert gas (TIG) (non-consumable electrode)
	<input checked="" type="checkbox"/>	Shielded metal arc welding (SMAW), also called manual metal arc welding (MMAW) and "stick"
		Plasma arc welding (PAW) (non-consumable electrode)
	<input checked="" type="checkbox"/>	Submerged arc welding (SAW)
		Other (Describe)
2	Abrasive Blasting N/A	<i>Please identify and briefly describe the process:</i>
3	Plating N/A	<i>Please identify the process, i.e., chromium, nickel, copper:</i>
	Electrolytic	
	Electroless	
4	Painting N/A	<i>Please identify and briefly describe the process:</i>

(continued)

G. Metal Fabrication Processes Conducted *(continued)*

5 ✓ Grinding	<i>Please identify and briefly describe the process: Deburr activity for shipping</i>
6 ✓ Machining	<i>Please identify and briefly describe the process: Finish Machine structures & weld mounts</i>
7 Thermal or Metal Spraying	<i>Please identify and briefly describe the process:</i>
8 Other	<i>Please identify and briefly describe the process:</i>
9 Other	<i>Please identify and briefly describe the process:</i>

H. Technical Contact (person who will be able to answer technical questions about this survey)

1 Name: Melissa R. Geigley
2 Title: Sr. HSE Specialist
3 Telephone: (713) 856-4145
4 FAX: (713) 937-5022
5 Email: Melissa.Geigley@nov.com

I. Geographic Coordinates (if available)

	1	Latitude and longitude of the center of the plant 29 deg. 46 min. .8 sec. & 95 deg. 21 min. .8 sec.
OR	2	UTM coordinates of the center of the plant

J. Regulatory Requirements *(Please indicate any Federal emission standards, such as NSPS or NESHAP, which are applicable to your facility): N/A*

<input type="checkbox"/>	40 CFR part 63, subpart N Chromium Electroplating NESHAP
<input type="checkbox"/>	40 CFR part 63, subpart T Halogenated Solvent Cleaning
<input type="checkbox"/>	Other (Please specify):

K. Facility Classification of Hazardous Air Pollutant (HAP) Emissions Status: N/A

Fill in to describe the status of your facility with respect to HAP emissions and permitting.

<i>Please check applicable boxes</i>		<i>Please state which operations influence the facility classifications (e.g., painting):</i>
<input type="checkbox"/>	EPA Major Source	
<input type="checkbox"/>	EPA Synthetic Minor Source	
<input type="checkbox"/>	EPA Minor/Area Source	

(continued)

K. Facility Classification of HAP Emissions Status: (continued)

<input type="checkbox"/>	Permitted by State as an Air Toxics Source	
<input type="checkbox"/>	EPA/State Title V	
<input type="checkbox"/>	Not classified for toxics/HAP	
<input type="checkbox"/>	Don't Know	

L. Facility Operating Permit with State or Local Air Pollution Agency (check all that apply):

Please provide copies of corresponding permits.

<input type="checkbox"/>	volatile organics	
<input type="checkbox"/>	particulate matter (any size)	
<input type="checkbox"/>	opacity/visibility	
<input type="checkbox"/>	odor	
<input type="checkbox"/>	air toxics	

M. Air Operating Permits /Toxic Release Inventory Reports - N/A

Permits *If any of the operations at your facility are subject to permit limits, please provide one copy of your air operating permit with this survey.*

TRI Reports *If you prepare a Toxics Release Inventory (TRI) report (form R), please enclose one copy of your latest complete report with this survey OR provide the TRI Facility ID number for your facility.*

N. Emission Tests

*Please enclose complete test reports from any emission tests conducted on HAP emitting processes and air pollution control devices (APCDs), if available. **No additional emissions testing or monitoring is required to respond to this questionnaire.** Please make sure you include the air pollution control devices operating conditions, and all appendices, including field data sheets, laboratory reports, example calculations, process data recorded during the test, and other supporting data.*

If you have any air emissions estimates from a source other than emission tests (e.g., calculated based on material consumption, etc.) please attach copies.

WORKSHEET TABLE 1. PRODUCTS, PROCESSES & WORK AREAS

Work Area		What Part or Product is Worked on in this Area?	In what Final Product(s) is this Part Used?	Operating Schedule		Processes Occurring in this Area*	
				Shifts /Day	Workers /Shift		
Example Data	Derrick Assembly Area	Derricks	Derricks	2	8	Welding, Machining	
	Your Data	Oilfield Equipment Fabrication	Oilfield Equip.	Oilfield Equipment	2	8	Welding & Fitting
		Oilfield Equipment Machining	Oilfield Equip.	Oilfield Equipment	2	12 - First 4- Second (Shifts)	Machining
		Oilfield Equipment Deburr	Oilfield Equip.	Oilfield Equipment	1	2	Deburr

* for example: welding, machining, grinding, abrasive blasting, painting, plating, or other (please describe)

WORKSHEET TABLE 2. ANNUAL HAP GENERATING MATERIAL USE - PLEASE ATTACH MSDS SHEETS HERE
Please fill in with details of all consumable materials used. Provide MSDS sheets where available.*

Material Name		Vendor & Part No. (AWS Number)	In What Work Area is this Material Used	How Much Was Used?		
				Hourly	Daily	Annual (2005)
Example Data	Welding Rod	7016-M COVERED ELCTD	Derrick Assembly			1,500 pounds
Your Data		10018D2	Oilfield Equipment			200 pounds
		045ESABII	Oilfield Equipment			7,124 pounds
		1/8 Lincoln	Oilfield Equipment			17,300 pounds
		2/32 10018D2	Oilfield Equipment			5,300 pounds
		1/8 x 36 316SS	Oilfield Equipment			160 pounds
		AKIO	Oilfield Equipment			390 pounds
		Flux 860/801	Oilfield Equipment			6,632 pounds

* for example: welding rod, blasting media, paints, solvents, plating baths, etc.

WORKSHEET TABLE 3. MATERIAL CONTENT

Please provide detailed information on each material from Worksheet 2 for which an MSDS has not been attached.

	Material Name	Vendor & Part No./Type	Chemical Content	VOC or HAP Content* (if known)	Density (if applicable)
Example Data	Sealant	Maktek Sealer #3456	Hexane	82.7%	6.7 lb/gal
Your Data					

* See Appendix 1 for explanation of abbreviations.

WORKSHEET TABLE 4. EMISSION CONTROLS

Please provide details of the way air pollution emissions are controlled for each process and work area.

Work Area		Purchased Materials Used in this Area	Is this area ventilated?	What air pollution control device is used in this area (if any)?	Percent Air Pollution Control & Pollutant Name
Example Data	Derrick Assembly	7016-M COVERED ELCTD Welding Rod	Yes	Cartridge Filter Unit, Torit 400c	96.5% Particulate Matter (PM)
	Abrasive Blaster #1	GMA Garnet™	Yes	Baghouse	99.9% PM
Your Data	Fabrication	Weld Rod / Wire	Yes	No	No

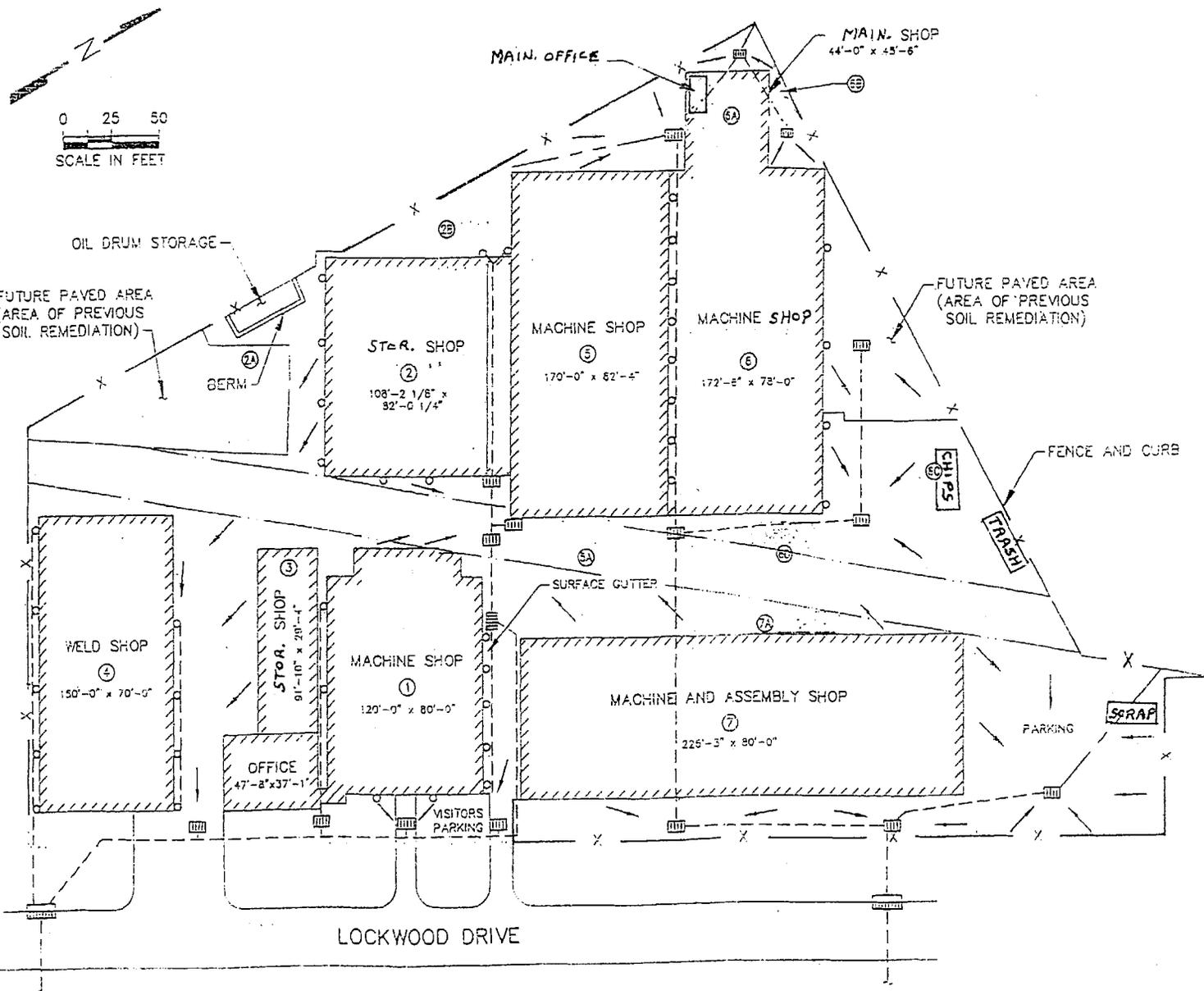
WORKSHEET TABLE 5. MATERIAL SUBSTITUTION - USING MATERIALS WHICH EMIT LESS HAP

Please provide details on any materials you use which have been selected because they emit less HAP than their alternative.

Provide MSDS for these materials where available.

	Material Name	Vendor & Part No.	Which HAP* emissions are reduced by using this material?	How Much HAP emission is reduced? (approximately)
Example Data	Low VOC solvent cleaner	U-Clean, Inc., No-VOC 1300	Methylene chloride	275 gallons/yr
Your Data				

* See Appendix 2 for a list of all Hazardous Air Pollutants (HAP)



0 25 50
 SCALE IN FEET

LEGEND

- - - DRAINAGE
- III STORM INLET
- ▨ ROOFED AREA
- DIRECTION OF STORMWATER FLOW
- X - FENCE
- o DOWNSPOUT
- ⑥ AREA NUMBER
- ROADWAY

WESTON
 ENGINEERS

FIGURE 2-1

STORMWATER POLLUTION
 PREVENTION PLAN
 SITE MAP
 HOUSTON, TEXAS

DATE AUG 1993	PROJECT NO. 10223002001	SCALE AS SHOWN
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L:\GWS\FORSYTH\COCC&P2.TV 1-80 08-27-93

4. VISITORS PARKING AREA NOT SHOWN AT THIS SCALE

**TUBOSCOPE, A VARCO COMPANY
(2005 SARA TITLE III REPORTING)**

FACILITY NAME: LOCKWOOD
 FACILITY MANAGER: _____ FACILITY PHONE NO.: _____
 MANAGER'S EMAIL: _____ FACILITY FAX NO.: _____
 PHYSICAL FACILITY ADDRESS: _____ STATE: _____ Zip Code: _____
 MAILING ADDRESS (if different): _____ STATE: _____ Zip Code: _____
 FACILITY COUNTY LOCATION: _____ GENERATOR STATUS: LQG / SQG / CESQG / NA
 24 HOUR EMERGENCY CONTACT (NAME): _____ TITLE: _____
 24 HOUR EMERGENCY CONTACT PHONE NUMBER: _____
 FACILITY SIC CODE _____ NUMBER OF EMPLOYEES: _____

Listed below is an inventory of the chemicals stored on site in calendar year 2005

CHEMICAL DESCRIPTION	TOTAL AMOUNT PURCHASED IN 2005		TOTAL AMOUNT USED IN 2005		NUMBER OF DAYS ON SITE IN 2005	MAXIMUM AMOUNT STORED ON SITE AT ANY ONE TIME IN 2005		TYPE AND SIZE OF CONTAINER	
	GAL	LBS	GAL	LBS		GAL	LBS	TYPE	SIZE
THINNING AND/OR CLEANING SOLVENTS									
1) VARSOL	110		80			55		D	55g
2) KEROSENE	55		25			55		D	58g
3) BLUEING REMOVER AEROSOL	240		240			36		AEROSOL CAN	120Z
4) MAGMA FLUX CLEANER	5		5			5		CAN	5g
5) MAGMA FLUX CLEANER AEROSOL	0		10			48		CAN	8.5
NDT - WHITE CONTRAST AEROSOL	252		168			60			
NDT - BLACK CONTRAST	360		220			84		CAN	16 OZ
MAG BATH	96		64			48		CAN	16 OZ
EXTERNAL COATINGS	0		1			2		CAN	1g
NDT - DEVELOPER	24		12			48		CAN	8.5
PETROLEUM OILS (Hydraulic ATF Motor Oils)	1068		922			611		CAN D A	5g 55g 165g
CUTTING OILS	627		591			219		CAN D	1g 55g
GASOLINE	30		20			10		GAS CAN	2 1/2g 5g
DIESEL	275		250			55		D	58g
GREASE									
BATTERY ACID	20		15			10		TUBE	140Z
PAINTS (Spray Cans)	102		66			48		AEROSOL CAN	120Z
PAINTS	8		4			12		CAN	1g
WELDING RODS & WIRE		33,352		32,752		3,600			
WELDING FLUX		7,032		6,632		3,200			
SIGNATURE					DATE				

Note:
 Obtain a recent MSDS for the chemicals from supplier. Attach a copy.
 On a separate map indicate a location where the chemicals are stored.
 Report any other chemical stored on site but not captured in the table.

MATERIAL SAFETY DATA SHEET
 May be used to comply with
 OSHA's Hazard Communication Standard,
 29 CFR 1910.1200. Standard must be
 consulted for specific requirements.

U.S. Department of Labor
 Occupational Safety and Health Administration
 (Non-Mandatory Form)
 Form Approved
 OMB No. 1218-0072

IDENTITY (As Used on Label and List)
SOLUCOAT 5039 SPECIAL

(NOTE: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.)

Section I

Manufacturer's Name WORKING SOLUTIONS, INC.	Emergency Telephone Number 800-424-9300 (CHEMTREC)
Address (Number, Street, City, State and ZIP Code) 2522 ROY CIRCLE HOUSTON, TEXAS 77007	Telephone Number for Information 713-862-3858
	Date Prepared 3/12/98
	Signature of Preparer (optional)

Section II HAZARDOUS INGREDIENTS IDENTIFICATION

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
PHOSPHORIC ACID CAS #7664-28-2	1 mg/m ³	1 mg/m ³		8-12%
SODIUM HYDROXIDE CAS #1310732	2 mg/m ³	2 mg/m ³ -C		3-6%
1-BUTOXYETHANOL CAS #111-76-2	50 ppm SKIN	50 ppm-C SKIN		4-7%
HYDROGEN FLUORIDE CAS #7664-39-3	3 ppm	C-3 ppm		1-2%

This information is for use in conformance to SARA Title III reporting requirements.

Section III PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point	210° F	Specific Gravity (H ₂ O = 1)	1.12
Vapor Pressure (mm Hg.)	N/D	Melting Point	N/A
Vapor Density (AIR = 1)	N/D	Evaporation Rate (Butyl Acetate = 1)	N/D

Solubility in Water:
 Complete

Appearance and Odor:
 Light amber liquid, mild acidic odor.

Section IV FIRE and EXPLOSION HAZARD DATA

Flash Point (Method Used) None	Flammable Limits N/A	LEL	UEL
-----------------------------------	-------------------------	-----	-----

Extinguishing Media
 N/A

Special Fire Fighting Procedures
 Keep fire exposed containers cooled with water spray. Wear full protective clothing and breathing apparatus.

Usual Fire and Explosion Hazards
 Thermal decomposition will yield toxic fumes of oxides of phosphorous.

Section V REACTIVITY DATA

Stability	Unstable	X	Conditions to Avoid Strong alkalis.
	Stable		

Incompatibility (Materials to Avoid)
 Strong oxidizing agents.

Thermal Decomposition or Byproducts
 Toxic vapors of oxides of phosphorous.

Hazardous Polymerization	May Occur	X	Conditions to Avoid
	Will Not Occur		

Section VI HEALTH HAZARD DATA

Route(s) of Entry:	Inhalation?	Yes	Skin?	Yes	Ingestion?	Yes
--------------------	-------------	-----	-------	-----	------------	-----

Health Hazards (Acute and Chronic)
 Irritating to skin and eyes. Irritating to respiratory tract, mucous membranes. May cause burns to skin and eyes if not promptly removed and treated. Accidental ingestion will result in internal irritation.

Carcinogenicity:	NTP?	No	IARC Monographs?	No	OSHA Regulated?	No
------------------	------	----	------------------	----	-----------------	----

Signs and Symptoms of Exposure:
 Burning, stinging, redness of skin and eyes. Coughing, headache, nausea if inhaled over prolonged/repeated periods of time.

Medical Conditions	Generally Aggravated by Exposure: No data available.
	Emergency and First Aid Procedures: SKIN & EYES: Flush with water for at least 15 minutes. If irritation persists, seek medical help. INHALATION: Remove to fresh air. Resuscitate if necessary. INGESTION: Do NOT induce vomiting. Give large quantities of water. Get medical help.

Section VII PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to Be Taken in Case Material is Released or Spilled:
 Contain spill area. Recover or reclaim product if possible. Vacuum pickup and place in suitable containers for recovery or disposal. Rinse residue off with large amounts of water.

Waste Disposal Method:
 Dispose of in accordance with local, state, and federal regulations.

Precautions to Be Taken in Handling and Storing:
 Store in cool, dry place. Keep away from strong alkalis. Keep container sealed when not in use.

Other Precautions:
 Do not reuse empty container.

Section VIII CONTROL MEASURES

Respiratory Protection (Specify Type):
 In confined areas, acid vapor respirator may be used.

Ventilation	Local Exhaust: Yes	Special:
	Mechanical (General): Preferred	Other:

Protective Gloves: Acid resistant.	Eye Protection: Chemical safety goggles and/or face shield.
---------------------------------------	--

Other Protective Clothing or Equipment:
 As needed to avoid eye and skin contact. Eye wash fountain. Safety shower.

Work/Hygienic Practices:
 Wash hands and face after using product. Launder contaminated clothing before reuse.

**** MATERIAL SAFETY DATA SHEET ****

Sodium Hydroxide Solutions, 40% and 50%

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Sodium Hydroxide Solutions, 40% and 50%

Catalog Numbers:

CRN55254 4, MCCSD0HYD20, RP 254 43F, 5S254 1, 5S254 20, 5S254 200, 5S254 4,
5S254 500, 5S254-1, 5S254-20, 5S254-200, 5S254-4, 5S254-500, 5S2544001,
5S254-500, 5S263-500, 5S410 20, 5S410 4, 5S411 10, 5S411 4

Synonyms:

None

Company Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410

For information, call: 201-796-7100

Emergency Number: 201-796-7100

For CHEMTREC assistance, call: 800-424-9300

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	Einecs#
1310-73-2	Sodium hydroxide	40-50	unlisted
7732-18-5	Water	50-60	unlisted

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: Clear.
Target Organs: None.

Potential Health Effects

Eye:

Causes severe eye burns.

Skin:

Causes skin burns.

May cause deep, penetrating ulcers of the skin.

Ingestion:

- ✓ Causes gastrointestinal tract burns.
- ✓ Causes severe pain, nausea, vomiting, diarrhea, and shock.

Inhalation:

- ✓ Irritation may lead to chemical pneumonitis and pulmonary edema.
- ✓ Causes severe irritation of upper respiratory tract with coughing, burns, breathing difficulty, and possible coma.

Chronic:

- ✓ Prolonged or repeated skin contact may cause dermatitis.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:

Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids.
Get medical aid immediately.

Skin:

Get medical aid immediately.
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.
Discard contaminated clothing in a manner which limits further exposure.

Ingestion:

Do NOT induce vomiting.
If victim is conscious and alert, give 2-4 cupfuls of milk or water.
Never give anything by mouth to an unconscious person.
Get medical aid immediately.

Inhalation:

Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Get medical aid.

Notes to Physician:

Treat symptomatically and supportively.
None reported.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:

Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products.
Use water with caution and in flooding amounts.

Extinguishing Media:

For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam.
Autoignition Temperature: Not applicable.
Flash Point: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:

Absorb spill with inert material, (e.g., dry sand or earth), then place into a chemical waste container.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:

Wash thoroughly after handling.
Use with adequate ventilation.
Do not get in eyes, on skin, or on clothing.
Do not ingest or inhale.

Storage:

Store in a cool, dry, well-ventilated area away from incompatible substances.
Keep away from strong acids.
Keep away from metals.
Keep away from flammable liquids.
Keep away from organic halogens.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:

Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Sodium hydroxide	C 2 mg/m ³	C 2 mg/m ³	2 mg/m ³ TWA
Water	none listed	none listed	none listed

Chemical Stability:

Stable.

Conditions to Avoid:

Incompatible materials, acids. ✓

Incompatibilities with Other Materials:

Reacts with mineral acids to form corresponding ✓

Hazardous Decomposition Products:

Toxic fumes of sodium oxide, sodium peroxide fumes.

Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:

CAS# 1310-73-2; WB4900000

CAS# 7732-18-5; ZC0110000

LD50/LC50:

CAS# 7732-18-5; Oral, rat; LD50 = 190 mL/kg.

CAS# 7732-18-5; Oral, rat; LD50 = 190 mL/kg.

Carcinogenicity:

Sodium hydroxide -

Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.

Water -

Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.

Epidemiology:

No information reported.

Teratogenicity:

No information reported.

Reproductive Effects:

No information reported.

Neurotoxicity:

No information reported.

Mutagenicity:

Mutation data reported.

Other Studies:

No information reported.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:

TLM, mosquitto fish, 125 ppm/96hr. (fresh water); TLM, bluegill, 99 mg/48hr. (tap water).

Environmental Fate:

Once liquid, sodium hydroxide leaches rapidly into the soil.
Physical/Chemical:
No information found.
Physical/Chemical:
No information found.

*** SECTION 13 - DISPOSAL CONSIDERATIONS ***

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants: Not listed.
RCRA D-Series Chronic Toxicity Reference Levels: Not listed.
RCRA F-Series: Not listed.
RCRA P-Series: Not listed.
RCRA U-Series: Not listed.
Not listed as a material banned from land disposal according to RCRA.

*** SECTION 14 - TRANSPORT INFORMATION ***

US DOT

Shipping Name: SODIUM HYDROXIDE SOLUTION
Hazard Class: 8
UN Number: UN1824
Packing Group: II

IMO

Shipping Name: SODIUM HYDROXIDE, SOLUTION
Hazard Class: 8
UN Number: 1824
Packing Group: 2

IATA

Shipping Name: SODIUM HYDROXIDE SOLUTION
Hazard Class: 8
UN Number: 1824
Packing Group: 2

RIB/ADR

Shipping Name: SODIUM HYDROXIDE SOLUTION
Dangerous Goods Code: 8(428)
UN Number: 1824

Canadian TCG

Shipping Name: SODIUM HYDROXIDE SOLUTION
Hazard Class: 8(9.2)
UN Number: UN1824

*** SECTION 15 - REGULATORY INFORMATION ***

A. Federal

TSCA

CAS# 1310-73-2 is listed on the TSCA inventory.

CAS# 7732-18-5 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA/SARA

Section 302 (RQ)

None of the chemicals in this material have an RQ.

Section 302 (TPQ)

None of the chemicals in this product have a TPQ.

Section 313

No chemicals are reportable under Section 313.

Clean Air Act:

This material does not contain any hazardous air pollutants.

This material does not contain any Class 1 Ozone depletors.

This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 1310-73-2 is listed as a Hazardous Substance under the CWA.

None of the chemicals in this product are listed as Priority

Pollutants under the CWA.

None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

B. State

Sodium hydroxide can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

Not present on state lists from CA, PA, MN, MA, FL, or NJ.

California No Significant Risk Level:

None of the chemicals in this product are listed.

C. International

Canada

CAS# 1310-73-2 is listed on Canada's DSL/NDL List.

CAS# 7732-18-5 is listed on Canada's OSL/NOSL List.
CAS# 1310-73-2 is listed on Canada's Ingredient Disclosure List.
CAS# 7732-18-5 is not listed on Canada's Ingredient Disclosure List.

European Labeling in Accordance with EC Directives

Hazard Symbols: Not available.

Risk Phrases:

Safety Phrases:

- S 23 Do not inhale gas/fumes/vapour/spray.
- S 24/25 Avoid contact with skin and eyes.
- S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- S 3/7/9 Keep container tightly closed in a cool, well-ventilated place.
- S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
- S 28A After contact with skin, wash immediately with plenty of water.

Exposure Limits:

OEL-AUSTRALIA:TWA 2 mg/m3. OEL-BELGIUM:STEL 2 mg/m3. OEL-DENMARK:TWA 2 mg/m3. OEL-FINLAND:TWA 2 mg/m3. OEL-FRANCE:TWA 2 mg/m3
WA 2 mg/m3. OEL-JAPAN:STEL 2 mg/m3. OEL-THE NETHERLANDS:TWA 2 mg/m3
EL-THE PHILIPPINES:TWA 2 mg/m3. OEL-SWEDEN:TWA 2 mg/m3. OEL-SWITZERLAN
D:TWA 2 mg/m3;STEL 4 mg/m3. OEL-THAILAND:TWA 2 mg/m3. OEL-TURKEY:TWA 2 mg/m3. OEL-UNITED KINGDOM:TWA 2 mg/m3;STEL 2 mg/m3. OEL IN BULGARIA,
COLOMBIA, JORDAN, KOREA check ACGIH TLV. OEL IN NEW ZEALAND, SINGAPORE
, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

Additional Information:

No additional information available.

MSDS Creation Date: July 5, 1995

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes.

Welding Flux



MSDS NO: HB-SUBOER
 REVISED: SEPTEMBER 1992
 CH-4324

MATERIAL SAFETY DATA SHEET

For U.S. Manufactured Welding Consumables and Related products

used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200 and Superfund Amendments and Reauthorization Act (SARA) of 1986. Public Law 99-499. Standard must be consulted for specific requirements.

SECTION 1 - IDENTIFICATION

Manufacturer/Supplier Name:	HOBART BROTHERS COMPANY	Telephone No: (513) 332-4000
Address:	600 WEST MAIN ST., TROY, OH 45373	Emergency No: (513) 332-4000
Name:	GROUP "A" OP121TT, OP41TT, OP122, OP71CR & OP76	Classification: NONE
	GROUP "B" RECORD IN, IND24 & INW-1	
	GROUP "C" RECORD NiCrW, NiCuW, NiCuW412, CuNi30W, NiCrT	
Use Type for:	GROUP "A" LOW ALLOY SUBMERGED ARC FLUX	
	GROUP "B" STAINLESS SUBMERGED ARC FLUX	
	GROUP "C" NICKEL BASE ALLOY SUBMERGED ARC FLUX	

SECTION 2 - HAZARDOUS MATERIALS
IMPORTANT

This section covers the materials from which this product is manufactured. The fumes and gases produced during welding with normal use of this product are covered by Section 5. The term "hazardous" in "Hazardous Materials" should be interpreted as a term required and defined in OSHA Hazard Communication Standard (29 CFR Part 1910.1200).

INGREDIENT	% WEIGHT GROUP A	% WEIGHT GROUP B	% WEIGHT GROUP C	CAS NO.	EXPOSURE LIMIT (mg/m ³)	
					OSHA PEL	ACGIH TLV
Al++	10-37	7-25	5-55	14808-60-7	0.1 R*	0.1 R*
AlRSPAR	14-40	10-25	5-10	7789-75-5	2.5 (as F)	2.5 (as F)
ALUMINUM OXIDE+	8-35	20-35	5-35	1344-28-1	5 R*	10 (as Al)
IRON OXIDE	<3	<2	<2	1309-37-1	10 (as Fe)	5 (as Fe)
CHROMIUM	<4	<3	—	7440-47-3	1	0.5
NIUM OXIDE	3-10	20-25	15-35	1305-78-8	5	2
NIESIUM OXIDE+	13-40	10-20	5-25	1309-48-4	5 R*	10
MANGANESE	<8	<3	<3	7439-96-5	5 CL**	5 CL**
TANTALUM DIOXIDE	—	—	5-20	13463-67-7	5 R*	10

* - Respirable Fraction. ** - Ceiling Limit. # - Reportable material under Section 313 of SARA.
 As a nuisance particulate covered under "Particulates Not Otherwise Regulated" by OSHA, or "Particulates Not Otherwise Classified" by ACGIH.
 - Crystalline silica is bound within the product as it exists in the package. However, research indicates silica is present in welding fume in the amorphous (noncrystalline) form.

SECTION 3 - PHYSICAL/CHEMICAL CHARACTERISTICS

Not Applicable

SECTION 4 - FIRE AND EXPLOSION HAZARD DATA

Welding consumables applicable to this sheet as shipped are nonreactive, nonflammable, nonexplosive and essentially nonhazardous until welded. Welding arcs and sparks can ignite combustibles and flammable products. See American National Standard Z49.1 referenced in Section 7.

SECTION 5 - REACTIVITY DATA

Hazardous Decomposition Products

Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, electrodes and electrodes used. Other conditions which also influence the composition and quantity of the fumes and gases to which workers may be exposed include: coatings on the metal being welded (such as paint, plating or galvanizing), the number of welders and the volume of the work area, the type and amount of ventilation, the position of the welder's head with respect to the fume plume, as well as the presence of contaminants in the work sphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing activities).

When the electrode is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section 2. Decomposition products of normal operation include those originating from the volatilization, reaction or oxidation of the materials shown in Section 2, plus those from the base metal and coating, etc., as noted above.

It is understood, however, that the elements and/or oxides to be mentioned are virtually always present as complex oxides and not as metals. (Characterization of Arc Welding Fume: American Welding Society.) The elements or oxides listed below correspond to the ACGIH categories located in [Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment]. Reasonably expected constituents of the fume would include: Primarily complex oxides of iron and fluorides; secondarily complex oxides of aluminum, manganese, chromium, titanium, silicon, magnesium, manganese and chromium (VI) compounds.

Other hazardous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc. The recommended way to determine the composition and quantity of fumes and gases to which workers are exposed is to take an air sample inside the welder's helmet if worn or in the worker's breathing zone. [See ANSI/AWS F1.1, available from the "American Welding Society," P.O. Box 351040, Miami, FL 33135. Also, from AWS is F1.3 "Evaluating Contaminants in the Welding Environment - A Sampling Strategy Guide," which gives additional information on sampling.] At a minimum, materials listed in this section should be analyzed.

INGREDIENT	CAS NO.	OSHA PEL	ACGIH TLV
CHROMIUM OXIDE	1305-78-8	5	2
FLUORIDES	—	2.5 (as F)	2.5 (as F)
ALUMINA (AMORPHOUS)	60676-86-0	0.1 R	0.1 R
IRON OXIDE	1309-37-1	10 (as Fe)	5 (as Fe)
ALUMINUM OXIDE	1344-28-1	5 R	10 (as Al)
NIESIUM OXIDE	1309-48-4	5 R	10
CHROMIUM (Cr II, Cr III COMPOUNDS)	—	0.5 (as Cr)	0.5 (as Cr)
CHROMIUM (Cr VI COMPOUNDS)	—	0.1 CL** (as Cr)	0.05, {A1} (as Cr)
TANTALUM DIOXIDE	13463-67-7	5 R	10
MANGANESE OXIDE	1344-43-0	1,3 STEL*** (as Mn)	1,3 STEL*** (as Mn)

**CL - Ceiling Limit

{A1} - Confirmed Human Carcinogen

***STEL-Short Term Exposure Limit

FOR U.S. MANUFACTURED WELDING CONSUMABLES AND RELATED PRODUCTS
 CONFORMS TO HAZARD COMMUNICATION STANDARD 29CFR 1910.1200 REV. SEPTEMBER 1985
 PURCHASE ORDER 965264

SECTION I - IDENTIFICATION

PRODUCT NAME

WIRE
 DATE JANUARY 1, 1990
 MANUFACTURER/SUPPLIER NAME AND ADDRESS
 THE LINCOLN ELECTRIC COMPANY
 22801 ST. CLAIR AVENUE
 CLEVELAND, OHIO 44117
 TELEPHONE 216-481-8100
 PRODUCT TYPE LOW ALLOY ELECTRODE
 CLASSIFICATION EAI

SECTION II - HAZARDOUS MATERIALS *

* IMPORTANT *

THIS SECTION COVERS THE MATERIALS FROM WHICH THIS PRODUCT IS MANUFACTURED. THE FUMES AND GASES PRODUCED DURING WELDING WITH THE NORMAL USE OF THIS PRODUCT ARE COVERED BY SECTION V; SEE IT FOR INDUSTRIAL HYGIENE INFORMATION
 * THE TERM HAZARDOUS IN *HAZARDOUS MATERIALS* SHOULD BE INTERPRETED AS A TERM REQUIRED AND DEFINED IN THE HAZARDS COMMUNICATION STANDARD AND DOES NOT NECESSARILY IMPLY THE EXISTENCE OF ANY HAZARD

COVERING OR FLUX INGREDIENTS (CAS NO.)

WT-% TLV MG/M3

LOW ALLOY STEEL WIRE

100

##

TLV: 10 MG/M3*
 PEL: 10 MG/M3*

***** SECTION NOTES *****

NOMINAL COMPOSITION:	CAS #	WT %	TLV	PEL
TOTAL MANGANESE***	7439-96-5	0.5	5	5(C)
TOTAL MOLYBDENUM	7439-98-7	0.5	10*	10*
TOTAL COPPER INCLUDING PLATED COATING***	7440-50-8	<0.5	10*	10*
IRON	7439-89-6	BAL.	10*	10*

TLV AND PEL REPORTED IN MG/M3.

SUPPLEMENTAL INFORMATION

- (*) NOT LISTED. NUISANCE VALUE MAXIMUM IS 10 MG. PER CUBIC METER.
- (***) SUBJECT TO THE REPORTING REQUIREMENTS OF SECTIONS 311, 312, AND 313 OF THE EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT OF 1986 AND OF 40CFR 370 AND 372.
- (C) CEILING VALUE NOT TO BE EXCEEDED AT ANY TIME.

SECTION III - FIRE AND EXPLOSION DATA

FLAMMABLE; WELDING ARC AND SPARKS CAN IGNITE COMBUSTIBLES AND FLAMMABLE SOLIDS. SEE 249.1 REFERENCED IN SECTION VI

SECTION IV - HEALTH HAZARD DATA

TRADE NAME
LINCOLNWELD L-70

THE AIRBORNE PARTICLES GENERATED BY WELDING AND ALLIED PROCESSES,
AVAILABLE FROM THE AMERICAN WELDING SOCIETY, 550 N.W. LEJEUNE ROAD, MIAMI,
FLA 33126.

SECTION VI AND VII CONTROL MEASURES AND PRECAUTIONS FOR SAFE HANDLING AND USE

READ AND UNDERSTAND THE MANUFACTURERS INSTRUCTIONS AND THE PRECAUTIONARY LABEL ON THE PRODUCT. SEE AMERICAN NATIONAL STANDARD Z49.1, SAFETY IN WELDING AND CUTTING PUBLISHED BY THE AMERICAN WELDING SOCIETY, 550 N.W. LEJEUNE ROAD, MIAMI FLORIDA 33126 AND OSHA PUBLICATION 2206 (29CFR1910), U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 20402 FOR MORE DETAIL ON MANY OF THE FOLLOWING:

VENTILATION

ENSURE ENOUGH VENTILATION, LOCAL EXHAUST AT THE ARC, OR BOTH, TO KEEP THE FUMES AND GASES FROM THE WORKERS BREATHING ZONE AND THE GENERAL AREA. TRAIN THE WELDER TO KEEP HIS HEAD OUT OF THE FUMES.

RESPIRATORY PROTECTION

USE A RESPIRABLE FUME RESPIRATOR OR AIR SUPPLIED RESPIRATOR WHEN WELDING IN A CONFINED SPACE OR GENERAL WORK AREA WHEN LOCAL EXHAUST OR VENTILATION DOES NOT PROVIDE EXPOSURE BELOW TLV.

EYE PROTECTION

USE A HELMET OR USE FACE SHIELD WITH FILTER LENS SHADE NUMBER * OR DARKER. ADVISE AND WELD OTHERS BY PROVIDING SCREENS AND FLASH GOGGLES.

PROTECTIVE CLOTHING

USE HAND, HEAD, AND BODY PROTECTION WHICH HELP TO PREVENT INJURY FROM RADIATION, SPARKS, AND ELECTRICAL SHOCK. SEE Z49.1. AT A MINIMUM THIS INCLUDES WELDERS GLOVES, GOGGLES, AND A PROTECTIVE FACE SHIELD, AND MAY INCLUDE ARM PROTECTORS, APRONS, SHOULDER PROTECTION, AS WELL AS DARK SUBSTANTIAL CLOTHING. TRAIN THE WELDER NOT TO PERMIT ELECTRICALLY LIVE PARTS OR ELECTRODES TO CONTACT SKIN...OR WEAR RUBBER SOLES OR GLOVES IF THEY ARE WET. INSULATE FROM WORK AND GROUND.

DISPOSAL INFORMATION

DISPOSE OF ANY PRODUCT, RESIDUE, DISPOSABLE CONTAINER, OR LINER AS ORDINARY WASTE IN AN ENVIRONMENTALLY ACCEPTABLE MANNER UNLESS OTHERWISE NOTED.

***** SECTION NOTES *****

(EYE PROTECTION)

(*) NO SPECIFIC RECOMMENDATION FOR SUBMERGED ARC.

THIS PRODUCT SAFETY DATA SHEET IS TAKEN FROM DATA FURNISHED TO BIG THREE INDUSTRIES, INC. BY LINCOLN ELECTRIC WHICH HAS REPRESENTED TO BIG THREE THAT IT CONFORMS TO HAZARD COMMUNICATIONS STANDARD 29 CFR 1910.1200. BIG THREE PROVIDES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, AND ASSUMES NO LIABILITY FOR THE ACCURACY OR COMPLETENESS OF THE DATA CONTAINED HEREIN.

PURCHASE ORDER 945328

SECTION I - IDENTIFICATION

TRADE NAME

~~WELD~~ DENWELD ST-100
 SIZES: ALL DATE: JANUARY 1, 1990
 MANUFACTURER/SUPPLIER NAME AND ADDRESS
 THE LINCOLN ELECTRIC COMPANY
 22801 ST. CLAIR AVENUE
 CLEVELAND, OHIO 44117
 TELEPHONE 216-481-8100
 PRODUCT TYPE SUBMERGED ARC ALLOY FLUX
 CLASSIFICATION NONE

FLUX

SECTION II - HAZARDOUS MATERIALS *

** IMPORTANT **

THIS SECTION COVERS THE MATERIALS FROM WHICH THIS PRODUCT IS MANUFACTURED. THE FUMES AND GASES PRODUCED DURING WELDING WITH THE NORMAL USE OF THIS PRODUCT ARE COVERED BY SECTION V; SEE IT FOR INDUSTRIAL HYGIENE INFORMATION

* THE TERM HAZARDOUS IN *HAZARDOUS MATERIALS* SHOULD BE INTERPRETED AS A TERM REQUIRED AND DEFINED IN THE HAZARDS COMMUNICATION STANDARD AND DOES NOT NECESSARILY IMPLY THE EXISTENCE OF ANY HAZARD

COVERING OR FLUX INGREDIENTS (CAS NO.)	WT O/O	TLV	MG/M3
MAGNESITE (CAS #: 1309-48-4) ## TLV: 10 MG/M3 PEL: 15 MG/M3	30		##
ZIRCONIUM ALLOYS AND COMPOUNDS (AS ZR) (CAS #: 12004-83-0) ## TLV: 5 MG/M3 PEL: 5 MG/M3	15		##
ALUMINUM OXIDE AND/OR BAUXITE*** (CAS #: 1344-28-1) ## TLV: 10 MG/M3 PEL: 10 MG/M3	10		##
SILICATES AND OTHER BINDERS (CAS #: 1344-09-8) ## TLV: 10 MG/M3* PEL: 10 MG/M3*	5		##
FERROCHROMIUM (AS CR)*** (CAS #: 11114-46-8) ## TLV: 0.5 MG/M3 PEL: 1.0 MG/M3	<5		##
MANGANESE AND/OR MANGANESE ALLOYS AND COMPOUNDS (AS MN)*** (CAS #: 7439-96-5) ## TLV: 5 MG/M3 PEL: 5 MG/M3(C)	<5		##
FLUORIDES (AS F) (CAS #: 7789-75-5) ## TLV: 2.5 MG/M3 PEL: 2.5 MG/M3	<5		##
IRON (CAS #: 65996-67-0) ## TLV: 10 MG/M3* PEL: 10 MG/M3*	1		##
SILICON AND/OR SILICON ALLOYS AND COMPOUNDS (AS SI) (CAS #: 8049-17-0) ## TLV: 10 MG/M3* PEL: 10 MG/M3*	1		##

TRADE NAME
LINCOLNWELD ST-100

(VLANIZING), THE NUMBER OF WELDERS AND THE VOLUME OF THE WORK AREA, THE QUALITY OF AMOUNT OF VENTILATION, THE POSITION OF THE WELDERS HEAD WITH RESPECT TO THE FUME PLUME, AS WELL AS THE PRESENCE OF CONTAMINANTS IN THE ATMOSPHERE (SUCH AS CHLORINATED HYDROCARBON VAPORS FROM CLEANING AND DEGREASING ACTIVITIES). WHEN THE ELECTRODE IS CONSUMED, THE FUME AND GAS DECOMPOSITION PRODUCTS GENERATED ARE DIFFERENT IN PERCENT AND FORM FROM THE INGREDIENTS LISTED IN SECTION II. DECOMPOSITION PRODUCTS OF NORMAL OPERATION INCLUDE THOSE ORIGINATING FROM THE VOLATILIZATION, REACTION, OR OXIDATION OF THE MATERIALS SHOWN IN SECTION II, PLUS THOSE FROM THE BASE METAL AND COATING, ETC., AS NOTED ABOVE.

REASONABLY EXPECTED FUME CONSTITUENTS OF THIS PRODUCT WOULD INCLUDE:

PRIMARILY IRON OXIDE AND FLUORIDES; SECONDARILY COMPLEX OXIDES OF ALUMINUM, CALCIUM, CHROMIUM, MAGNESIUM, MANGANESE, SILICON, SODIUM AND ZIRCONIUM WHEN USED WITH RECOMMENDED LINCOLNWELD ELECTRODES. (SEE MSDS FOR ELECTRODE BEING USED.)

MAXIMUM FUME EXPOSURE GUIDELINE AND PEL FOR THIS PRODUCT IS 5.0 MILLIGRAMS PER CUBIC METER.
N/A

GASEOUS REACTION PRODUCTS MAY INCLUDE CARBON MONOXIDE AND CARBON DIOXIDE. OZONE AND NITROGEN OXIDES MAY BE FORMED BY THE RADIATION FROM THE ARC.

ONE RECOMMENDED WAY TO DETERMINE THE COMPOSITION AND QUANTITY OF FUMES AND GASES TO WHICH WORKERS ARE EXPOSED IS TO TAKE AN AIR SAMPLE FROM INSIDE THE WELDERS HELMET IF WORN OR IN THE WORKERS BREATHING ZONE. SEE ANSI/AWS F1.1 METHOD FOR SAMPLING AIRBORNE PARTICLES GENERATED BY WELDING AND ALLIED PROCESSES, AVAILABLE FROM THE AMERICAN WELDING SOCIETY, 550 N.W. LEJEUNE ROAD, MIAMI, FLORIDA 33126.

SECTION VI AND VII CONTROL MEASURES AND PRECAUTIONS FOR SAFE HANDLING AND USE

READ AND UNDERSTAND THE MANUFACTURERS INSTRUCTIONS AND THE PRECAUTIONARY LABEL ON THE PRODUCT. SEE AMERICAN NATIONAL STANDARD Z49.1, SAFETY IN WELDING AND CUTTING PUBLISHED BY THE AMERICAN WELDING SOCIETY, 550 N.W. LEJEUNE ROAD, MIAMI, FLORIDA 33126 AND OSHA PUBLICATION 2206 (29CFR1910), U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 20402 FOR MORE DETAIL ON MANY OF THE FOLLOWING:

VENTILATION

USE ENOUGH VENTILATION, LOCAL EXHAUST AT THE ARC, OR BOTH, TO KEEP THE FUMES AND GASES FROM THE WORKERS BREATHING ZONE AND THE GENERAL AREA. TRAIN THE WELDER TO KEEP HIS HEAD OUT OF THE FUMES.

RESPIRATORY PROTECTION

USE RESPIRABLE FUME RESPIRATOR OR AIR SUPPLIED RESPIRATOR WHEN WELDING IN CONFINED SPACE OR GENERAL WORK AREA WHEN LOCAL EXHAUST OR VENTILATION DOES NOT KEEP EXPOSURE BELOW TLV.

EYE PROTECTION

WEAR HELMET OR USE FACE SHIELD WITH FILTER LENS SHADE NUMBER * OR DARKER SHIELD OTHERS BY PROVIDING SCREENS AND FLASH GOGGLES.

PROTECTIVE CLOTHING

WEAR HAND, HEAD, AND BODY PROTECTION WHICH HELP TO PREVENT INJURY FROM RADIATION SPARKS, AND ELECTRICAL SHOCK. SEE Z49.1. AT A MINIMUM THIS INCLUDES WELDERS GLOVES AND A PROTECTIVE FACE SHIELD, AND MAY INCLUDE ARM PROTECTORS, APRONS, HATS, SHOULDER PROTECTION, AS WELL AS DARK SUBSTANTIAL CLOTHING. TRAIN THE WELDER NOT TO PERMIT ELECTRICALLY LIVE PARTS OR ELECTRODES TO CONTACT SKIN...OR CLOTHING OR GLOVES IF THEY ARE WET. INSULATE FROM WORK AND GROUND.

DISPOSAL INFORMATION

DISCARD ANY PRODUCT, RESIDUE, DISPOSABLE CONTAINER, OR LINER AS ORDINARY WASTE IN AN ENVIRONMENTALLY ACCEPTABLE MANNER UNLESS OTHERWISE NOTED.

FOR U.S. MANUFACTURED WELDING CONSUMABLES AND RELATED PRODUCTS

CONFORMS TO HAZARD COMMUNICATION STANDARD 29CFR 1910.1200 REV. SEPTEMBER 1985

PURCHASE ORDER 10515

SECTION I - IDENTIFICATION

TRADE NAME ~~LINCOLN WELD L-61~~ WIRE
 SIZES: ALL DATE JANUARY 1, 1990
 MANUFACTURER/SUPPLIER NAME AND ADDRESS
 THE LINCOLN ELECTRIC COMPANY
 22801 ST. CLAIR AVENUE
 CLEVELAND, OHIO 44117
 TELEPHONE 216-481-8100
 PRODUCT TYPE CARBON STEEL ELECTRODE
 CLASSIFICATION EMI2K

SECTION II - HAZARDOUS MATERIALS *

**** IMPORTANT ****
 THIS SECTION COVERS THE MATERIALS FROM WHICH THIS PRODUCT IS MANUFACTURED. THE FUMES AND GASES PRODUCED DURING WELDING WITH THE NORMAL USE OF THIS PRODUCT ARE COVERED BY SECTION V; SEE IT FOR INDUSTRIAL HYGIENE INFORMATION
 * THE TERM HAZARDOUS IN *HAZARDOUS MATERIALS* SHOULD BE INTERPRETED AS A TERM REQUIRED AND DEFINED IN THE HAZARDS COMMUNICATION STANDARD AND DOES NOT NECESSARILY IMPLY THE EXISTENCE OF ANY HAZARD

COVERING OR FLUX INGREDIENTS (CAS NO.)	WT O/O	TLV	MG/M3
C IN STEEL WIRE	100		##
## TLV: 10 MG/M3*			
PEL: 10 MG/M3*			

***** SECTION NOTES *****

NOMINAL COMPOSITION:	CAS #	WT %	TLV	PEL
TOTAL MANGANESE***	7439-96-5	1	5	5(C)
TOTAL COPPER INCLUDING PLATED COATING***	7440-50-8	<0.5	10*	10*
IRON	7439-89-6	BAL.	10*	10*

TLV AND PEL REPORTED IN MG/M3.

SUPPLEMENTAL INFORMATION

- (*) NOT LISTED. NUISANCE VALUE MAXIMUM IS 10 MG. PER CUBIC METER.
- (***) SUBJECT TO THE REPORTING REQUIREMENTS OF SECTIONS 311, 312, AND 313 OF THE EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT OF 1986 AND OF 40 CFR 370 AND 372.
- (C) CEILING VALUE NOT TO BE EXCEEDED AT ANY TIME.

SECTION III - FIRE AND EXPLOSION DATA

NON-FLAMMABLE; WELDING ARC AND SPARKS CAN IGNITE COMBUSTIBLES AND FLAMMABLE PRODUCTS. SEE 249.1 REFERENCED IN SECTION VI

SECTION IV - HEALTH HAZARD DATA

TRADE NAME
LINCOLNWELD L-61

FLORIDA 33126.

SECTION VI AND VII CONTROL MEASURES AND PRECAUTIONS FOR SAFE HANDLING AND USE

READ AND UNDERSTAND THE MANUFACTURERS INSTRUCTIONS AND THE PRECAUTIONARY LABEL ON THE PRODUCT. SEE AMERICAN NATIONAL STANDARD Z49.1, SAFETY IN WELDING AND CUTTING PUBLISHED BY THE AMERICAN WELDING SOCIETY, 550 N.W. LEJEUNE ROAD, MIAMI FLORIDA 33126 AND OSHA PUBLICATION 2206 (29CFR1910). U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 20402 FOR MORE DETAIL ON MANY OF THE FOLLOWING:

VENTILATION

USE ENOUGH VENTILATION, LOCAL EXHAUST AT THE ARC, OR BOTH, TO KEEP THE FUMES AND GASES FROM THE WORKERS BREATHING ZONE AND THE GENERAL AREA. TRAIN THE WELDER TO KEEP HIS HEAD OUT OF THE FUMES.

RESPIRATORY PROTECTION

USE RESPIRABLE FUME RESPIRATOR OR AIR SUPPLIED RESPIRATOR WHEN WELDING IN CONFINED SPACE OR GENERAL WORK AREA WHEN LOCAL EXHAUST OR VENTILATION DOES NOT KEEP EXPOSURE BELOW TLV.

EYE PROTECTION

WEAR HELMET OR USE FACE SHIELD WITH FILTER LENS SHADE NUMBER * OR DARKER SHIELD OTHERS BY PROVIDING SCREENS AND FLASH GOGGLES.

PROTECTIVE CLOTHING

WEAR HAND, HEAD, AND BODY PROTECTION WHICH HELP TO PREVENT INJURY FROM RADIATION, SPARKS, AND ELECTRICAL SHOCK. SEE Z49.1. AT A MINIMUM THIS INCLUDES WELDERS GLOVES AND A PROTECTIVE FACE SHIELD, AND MAY INCLUDE ARM PROTECTORS, APRONS, SHOULDER PROTECTION, AS WELL AS DARK SUBSTANTIAL CLOTHING. TRAIN THE WELDER NOT TO PERMIT ELECTRICALLY LIVE PARTS OR ELECTRODES TO CONTACT SKIN...OR CLOTHING OR GLOVES IF THEY ARE WET. INSULATE FROM WORK AND GROUND.

DISPOSAL INFORMATION

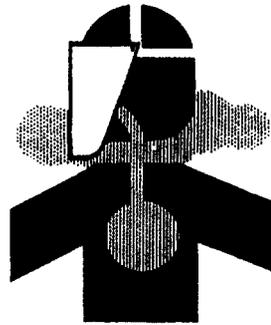
DISCARD ANY PRODUCT, RESIDUE, DISPOSABLE CONTAINER, OR LINER AS ORDINARY WASTE IN AN ENVIRONMENTALLY ACCEPTABLE MANNER UNLESS OTHERWISE NOTED.

***** SECTION NOTES *****

(EYE PROTECTION)

(*) NO SPECIFIC RECOMMENDATION FOR SUBMERGED ARC.

THIS PRODUCT SAFETY DATA SHEET IS TAKEN FROM DATA FURNISHED TO BIG THREE INDUSTRIES, INC. BY LINCOLN ELECTRIC WHICH HAS REPRESENTED TO BIG THREE THAT IT CONFORMS TO HAZARD COMMUNICATIONS STANDARD 29 CFR 1910.1200. BIG THREE PROVIDES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, AND ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE DATA CONTAINED HEREIN.



MATERIAL SAFETY DATA SHEET

For Manufactured Welding Consumables and Related Products

Prepared to meet the requirements of OSHA's Hazard Communication Standard, 29 CFR 1910.1200 and the Superfund Amendments and Reauthorization Act of 1986, Public Law 99-499.

MSDS data sheets supplemental to this data sheet are available for all nonstandard and experimental products.

Please also obtain, read, and understand our latest SAFETY AND HEALTH BULLETIN. Available from Teledyne McKay or your local distributor.

TABLE OF CONTENTS

Section Content	Page
1. MANUFACTURER/SUPPLIER	1
2. PRODUCT IDENTIFICATION AND INGREDIENTS (INCLUDING HAZARDOUS INGREDIENTS)	1
MILD AND LOW ALLOY STEEL PRODUCTS	2
Table 1 — Mild Steel Covered Electrodes	2
Table 2 — Mild Steel Solid Welding Wires	2
Table 3 — Mild Steel Low Hydrogen Covered Electrodes	2
Table 4 — Speed-Alloy Mild Steel Flux Cored Gas Shielded Welding Wires	2
Table 5 — Low Alloy Low Hydrogen Covered Electrodes	2
Table 6 — Speed-Alloy Low Alloy Flux Cored Gas Shielded Welding Wires	3
Table 7 — Speed-Alloy Metal Cored Submerged Arc Welding Wires	3
STAINLESS AND NICKEL BASE PRODUCTS	4
Table 8 — Stainless Steel Covered Electrodes	4
Table 9 — Stainless Steel Solid Welding Wires	4
Table 10 — In-Flux O Stainless Steel & Nickel Base Flux Cored Open Arc Welding Wires	5
Table 11 — In-Flux T1 Stainless Steel Flux Cored Gas Shielded Welding Wires	5
Table 12 — In-Flux G/S Stainless Steel Metal Cored Gas Shielded Submerged Arc Welding Wires	5
MAINTENANCE LINE PRODUCTS	6
Table 13 — Hardalloy Surfacing Covered Electrodes	6
Table 14 — Tube-Alloy O Flux Cored Open Arc Surfacing Wires	6
Table 15 — Tube-Alloy S Metal Cored Submerged Arc Surfacing Wires	6
Table 16 — Special Maintenance Covered Electrodes & Welding Wires	7
Table 17 — Cast-Alloy Covered Electrodes for Cast Iron Welding	7
3. PHYSICAL/CHEMICAL CHARACTERISTICS	7
4. FIRE AND EXPLOSION HAZARD DATA	7
5. REACTIVITY DATA—HAZARDOUS DECOMPOSITION PRODUCTS	7
6. EXPOSURE LIMITS AND HEALTH HAZARD DATA	10
Compounds, CAS Numbers, Allowable Exposure Limits, and potential short and long term health effects of excessive exposure.	
7. PRECAUTIONS FOR SAFE HANDLING AND USE	12
8. CONTROL MEASURES	12
9. SECTION 313 SUPPLIER NOTIFICATION	12

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Section 2—PRODUCT IDENTIFICATION AND INGREDIENTS (INCLUDING HAZARDOUS INGREDIENTS)

This section covers the materials from which these products are manufactured and their weld deposit compositions. When the product is consumed, the fume and gas decomposition products produced are different in percent and form from the ingredients in this section.

The ingredient or ingredients in the product which form the potentially most hazardous decomposition product are marked in these tables with an asterisk (*). We recommend monitoring for these. See Sections 5 and 6 and McKay's SAFETY AND HEALTH BULLETIN for more details.

For explanation of ingredients marked with the symbol † in these tables, see Section 9 - Section 313 Supplier Notification.

**Table 1—McKAY MILD STEEL COVERED ELECTRODES
To AWS A5.1, Specification for Carbon Steel Covered Arc Welding Electrodes**

McKAY GRADE	AWS CLASS	TYPICAL DEPOSIT CHEMISTRY, %				OTHER INGREDIENTS
		Carbon C	Manganese Mn †	Silicon Si	Iron Fe	
6010	E6010	.10	.30	.25	Balance	Oxides of Aluminum (Al), Calcium (Ca), Magnesium (Mg), Potassium (K), Sodium (Na), and Titanium (Ti), in Various Compounds
6011	E6011	.08	.35	.25	Balance	
6012	E6012	.09	.50	.25	Balance	
6013	E6013	.09	.50	.25	Balance	
7014	E7014	.08	.70	.45	Balance	
7024	E7024	.07	.90	.45	Balance	

**Table 2—McKAY MILD STEEL SOLID WELDING WIRES
To AWS A5.18, Specification for Carbon Steel Filler Metals for Gas Shielded Arc Welding with CO₂, Argon-CO₂ mixes, or Argon-Oxygen mixes**

McKAY GRADE	AWS CLASS	TYPICAL WIRE CHEMISTRY, %					OTHER INGREDIENTS
		Carbon C	Manganese Mn †	Silicon Si	Copper Cu †	Iron Fe	
S-3	ER70S-3	.09	1.10	.6	.3*	Balance	None
S-6	ER70S-6	.08	1.50	.9	.3*	Balance	

*We recommend air monitoring. See Sections 5 and 6 and the labels on the product containers.

**Table 3—McKAY MILD STEEL LOW HYDROGEN COVERED ELECTRODES
To AWS A5.1, Specification for Carbon Steel Covered Arc Welding Electrodes**

McKAY GRADE	AWS CLASS	TYPICAL DEPOSIT CHEMISTRY, %				OTHER INGREDIENTS
		Carbon C	Manganese Mn †	Silicon Si	Iron Fe	
7016	E7016	.08	.80	.30	Balance	Same as Table 1 plus Fluorides (CaF ₂ or others)
7018M	E7018	.07	1.05	.45	Balance	
7018 XLM	E7018	.06	1.10	.50	Balance	
7018-1 XLM	E7018	.07	1.35	.50	Balance	

**Table 4—McKAY SPEED-ALLOY MILD STEEL FLUX CORED GAS SHIELDED WELDING WIRES
To AWS A5.5, Specification for Carbon Steel Electrodes for Flux-Cored Arc Welding. V Types for flat, horizontal and vertical with CO₂ or 75/25 Argon-CO₂ shielding. Other Types for flat or horizontal with CO₂ shielding**

McKAY GRADE	AWS CLASS	TYPICAL DEPOSIT CHEMISTRY WITH CO ₂ , %				OTHER INGREDIENTS
		Carbon C	Manganese Mn †	Silicon Si	Iron Fe	
66 (1)	EG 72T-2	.08	1.50	.35	Balance	Most of the following: Oxides of Aluminum (Al), Calcium (Ca), Potassium (K), Sodium (Na), Titanium (Ti), and Fluorides (CaF ₂ or others).
71	E70T-1	.08	1.35	.50	Balance	
71-V	E71T-1	.07	1.35*	.45	Balance	
74	E70T-4	.08	.90	.60	Balance	
75	E70T-5	.08	1.25	.50	Balance	
77	E70T-G	.07	1.40*	.40	Balance	

*We recommend air monitoring for these. See Sections 5 and 6 and the labels on the product containers.
(1) To AWS A5.26, Consumables used for ElectroGas Welding.

**Table 5—McKAY LOW ALLOY LOW HYDROGEN COVERED ELECTRODES
To AWS A5.5, Specification for Low Alloy Steel Covered Arc Welding Electrodes**

McKAY GRADE	AWS CLASS	TYPICAL DEPOSIT CHEMISTRY, %								OTHER INGREDIENTS
		Carbon C	Manganese Mn †	Silicon Si	Chromium Cr †	Nickel Ni †	Molybdenum Mo	Copper Cu †	Iron Fe	
7018-A1 XLM	E7018-A1	.08	.60	.45			.50		Balance	Oxides of Aluminum (Al), Calcium (Ca), Magnesium (Mg), Potassium (K), Sodium (Na), Strontium (Sr), Titanium (Ti), and Calcium Fluoride (CaF ₂)
7018-C2L XLM	E7018-C2L	.04	.65	.40		3.30			Balance	
7018-HC	None	.21	1.00	.60					Balance	
8018-G XLM	E8018-G	.08	1.30	.45			.20		Balance	
8018-W XLM	E8018-W	.07	.80	.45	.60	.50		.50	Balance	
8018-B2 XLM	E8018-B2	.09	.80	.50	1.20		.55		Balance	
8018-B2L XLM	E8018-B2L	.04	.80	.35	1.25		.50		Balance	
8018-C3 XLM	E8018-C3	.05	.90	.45		.95			Balance	
8018-C1 XLM	E8018-C1	.08	.90	.45		2.30			Balance	
8018-C2 XLM	E8018-C2	.08	.85	.40		3.30			Balance	
9018-M XLM	E9018-M	.08	1.00	.40		1.60	.20		Balance	
9018-B3 XLM	E9018-B3	.07	.80	.35	2.25*		1.05		Balance	
9018-B3L XLM	E9018-B3L	.04	.80	.35	2.25*		1.05		Balance	
9018-G XLM	E9018-G	.07	1.50	.45			.55		Balance	
10018-M XLM	E10018-M	.06	1.25	.40	.10	1.55	.30		Balance	
10018-D2 XLM	E10018-D2	.11	1.85	.45		.75	.35		Balance	
11018-M XLM	E11018-M	.07	1.50	.40		1.60	.40		Balance	
12018-M XLM	E12018-M	.07	1.50	.40	.45	2.00	.40		Balance	
502-18**	E502-18	.08	.80	.40	5.00*		.50		Balance	
505-18**	E505-18	.06	.80	.45	9.25*		1.00		Balance	

*We recommend air monitoring for these. See Sections 5 and 6 and the labels on the product containers.

**These grades are now in AWS A5.4 but will be removed from there and put in AWS A5.5 as E502-18 and E505-18 respectively.

Table 6—McKAY SPEED-ALLOY LOW ALLOY FLUX CORED GAS SHIELDED WELDING WIRES

To AWS A5.29, Specification for Low Alloy Steel Electrodes for Flux-Cored Arc Welding. V Types for flat, horizontal and vertical with CO₂ or 75/25 Argon/CO₂ shielding. Other Types for flat and horizontal with CO₂ shielding

McKAY GRADE	AWS CLASS	TYPICAL DEPOSIT CHEMISTRY WITH CO ₂ , %								OTHER INGREDIENTS
		Carbon C	Manganese Mn †	Silicon Si	Chromium Cr †	Nickel Ni †	Molybdenum Mo	Copper Cu †	Iron Fe	
70-A1	E70T5-A1	.08	.85	.50				.55		Balance
71-A1	E80T1-A1	.08	.90	.55				.55		Balance
71A1-V	E81T1-A1	.06	1.10*	.85				.50		Balance
75-A1	E70T5-A1	.08	.85	.50				.55		Balance
81B2-L	E80T1-B2	.04	.80	.55	1.15			.50		Balance
81B2L-V	E81T1-B2	.03	.85*	.55	1.15			.50		Balance
81NI1-V	E81T1-Ni1	.05	1.20*	.30		.95				Balance
81NI2-V	E81T1-Ni2	.06	1.00*	.35		2.00				Balance
81-W	E80T1-W	.07	1.05	.55	.55	.60			.50	Balance
81W-V	E80T1-W	.05	1.20*	.50	.60	.70			.60	Balance
85	E80T5-K2	.08	1.00	.55		1.30		.15		Balance
85-B2	E80T5-B2	.08	.80	.55	1.40			.55		Balance
85-B2L	E80T5-B2L	.04	.80	.55	1.40			.55		Balance
85-C1	E80T5-Ni2	.08	.95	.55		2.50				Balance
85-C2	E90T5-Ni3	.06	1.00	.55		3.30				Balance
85-C3	E80T5-K1	.05	.95	.55		.95	.55			Balance
86 (1)	EG80T-G	.06	1.30	.30		1.70	.20			Balance
86-B2 (1)	EG80T-G	.07	.80	.40	1.20		.55			Balance
87-W (2)	E80C-G	.07	1.00	.45	.55	.65			.60	Balance
91	E90T1-K2	.08	1.30	.55		1.50	.15			Balance
91B3-L	E90T1-B3L	.03	.80	.55	2.40		1.05			Balance
91B3L-V	E91T1-B3	.04	.90*	.50	2.15		1.05			Balance
91B3-V	E91T1-B3	.09	1.10*	.60	2.20		1.05			Balance
95	E90T5-K2	.08	1.25	.50		1.60	.20			Balance
95-D2	E90T5-D2	.07	1.85	.50			.45			Balance
105	E100T5-K3	.08	1.35	.55		2.00	.30			Balance
105-D2	E100T5-D2	.09	1.90	.55			.40			Balance
107 (2)	E100C-G	.05	1.20	.30		1.80	.30			Balance
111	E110T1-K3	.06	1.45	.60		2.10	.35			Balance
111-V	E110T1-K3	.05	1.70*	.40		2.00	.40			Balance
115	E110T5-K3	.06	1.50	.55		2.20	.30			Balance
117 (2)	E110C-G	.06	1.30*	.30		2.20	.35			Balance
121-H	E120T1-K5	.18	1.40	.55	.45	1.25	.30			Balance
125	E120T5-K4	.06	1.40	.55	.40	2.20	.35			Balance
4130-V	E121T1-G	.19	1.20*	.80	1.10		.35			Balance
5025 (3)	E502T-1	.05	.90	.55	5.0		.55			Balance
5055 (3)	E505T-1	.05	.90	.55	9.0*		1.0			Balance

Most of the following: Oxides of Aluminum (Al), Calcium (Ca), Potassium (K), Sodium (Na), Titanium (Ti), and Fluorides (CaF₂ or others).

*We recommend air monitoring for these. See Sections 5 and 6 and the labels on the product containers.

- (1) To AWS A5.26, Consumables Used for Electrode Gas Welding
- (2) To AWS A5.28, Low Alloy Filler Metals for Gas Shielded Arc Welding
- (3) To AWS A5.22, Flux Cored Corrosion-Resisting Chromium and Chromium-Nickel Steel Electrodes

Table 7—McKAY SPEED ALLOY METAL CORED SUBMERGED ARC WELDING WIRES

To AWS A5.23, Specification for Low Alloy Steel Electrodes and Fluxes for Submerged Arc Welding. Chemistry using L-TEC 80 Flux except as noted by (1), (2) and (3)

McKAY GRADE	AWS CLASS	TYPICAL DEPOSIT CHEMISTRY WITH SPECIFIED FLUX, %								OTHER INGREDIENTS
		Carbon C	Manganese Mn †	Silicon Si	Chromium Cr †	Nickel Ni †	Molybdenum Mo	Copper Cu †	Iron Fe	
70-S	F7A4-ECG-G	.10	1.50	.40						Balance
70B6-S	F7P0-ECB6-B6	.05	.90	.45	5.0		.50			Balance
70NI1-S	F7P4-ECNi1-Ni1	.06	1.0	.45		1.0	.25			Balance
70NI2-S	F7P8-ECNi2-Ni2	.05	.90	.40		2.25				Balance
70NI3-S	F7P10-ECNi3-Ni3	.05	.85	.40		3.40				Balance
80A3-S	F8P0-ECA3-A3	.07	.90	.45			.55			Balance
80B2-S	F8PZ-ECB2-B2	.05	1.00	.40	1.30		.50			Balance
82B2-S (2)	F8PZ-ECB2-B2	.04	1.00	.50	1.30		.50			Balance
80NI3-S (1)	F8P10-ECNi3-Ni3	.05	.85	.35		3.40				Balance
80W-S	F8A2-ECW-W	.05	1.20	.50	.65	.60		.55		Balance
90-S	F9A0-ECM1-M1	.09	1.30	.40		1.80	.20			Balance
92-S (2)	F9A2-ECM1-M1	.08	1.30	.30		1.50	.15			Balance
100B3-S	F10PZ-ECB3-B3	.10	.80	.40	2.25		1.05			Balance
100F3-S (3)	F10P2-ECF3-F3	.09	1.50	.40		.85	.50			Balance
110-S	F11A0-ECM3-M3	.06	1.60	.50		2.40	.45			Balance
112-S (2)	F11A2-ECM3-M3	.06	1.70	.25		2.40	.45			Balance
120-S	F12A0-ECM3-M3	.08	1.60	.50	.50	2.40	.45			Balance
215513-S (2)	F8PZ-ECB2-B2	.05	.80	.25	1.25		.55			Balance

*We recommend air monitoring for fluorides on all the grades shown. The TLV/PEL for fluorides is 2.5 mg/m³ as fluorine.

- (1) L-TEC 0091 Flux.
- (2) Lincoln 880 Flux.
- (3) Lincoln 882 Flux.

**Table 8—McKAY STAINLESS STEEL AC-DC, DC LIME, DCT ** AND DCT-2 ** COVERED ELECTRODES
To AWS A5.4, Specification for Covered Corrosion-Resisting Chromium and Chromium-Nickel Steel Welding Electrodes**

McKAY GRADE	AWS CLASS	TYPICAL DEPOSIT CHEMISTRY, %												OTHER COVERING INGREDIENTS
		Carbon C	Manganese Mn †	Silicon Si	Chromium Cr †	Nickel Ni †	Molybdenum Mo	Columbium Tantalum Cb + Ta	Copper Cu †	Tungsten W	Titanium Ti	Nitrogen N	Iron Fe	
308/308H**	E308/308H	.06	1.00	.40	20.2*	9.8							Balance	Oxides and/or Fluorides (F) of: Aluminum (Al) Calcium (Ca) Magnesium (Mg) Potassium (K) Sodium (Na) Titanium (Ti)
308HC	308HC(1)	.12	1.50	.30	19.0*	10.1							Balance	
308L**	E308L	.03	1.00	.40	20.2*	9.8							Balance	
309**	E309	.07	1.00	.35	23.4*	12.5							Balance	
309Cb	E309Cb	.07	1.00	.50	23.0*	13.0		.85					Balance	
309HC	None	1.1	2.00	.45	22.5*	12.5							Balance	
309Mo	E309Mo	.07	1.00	.40	22.3*	13.0	2.30						Balance	
309L**	E309L	.035	1.00	.50	23.0*	13.2							Balance	
309LMo	E309Mo	.03	.90	.35	22.5*	12.5	2.2						Balance	
310	E310	.13	2.10	.50	26.2*	21.0							Balance	
310H	310H	.40	2.25	.40	26.2*	21.4							Balance	
310Cb	E310Cb	.10	2.10	.45	26.0*	21.0		.85					Balance	
310Mo	E310Mo	.10	2.10	.45	26.0*	21.0	2.25						Balance	
312	E312	.10	1.30	.60	29.0*	9.0							Balance	
312Mo	None	.10	1.70	.60	29.0*	9.0	2.0						Balance	
316/316H	E316/316H	.08	1.85	.35	18.0*	13.0	2.15						Balance	
316/316H HF**	E316/316H	.04	1.20	.35	19.3*	11.5	2.35						Balance	
316L	E316L	.03	1.60	.35	18.0*	13.2	2.25						Balance	
Kryo-Kay 316L	E316L	.025	2.10	.30	17.7*	13.6	2.10						Balance	
316L HF**	E316L	.03	1.00	.35	19.5*	11.6	2.25						Balance	
317**	E317	.06	1.80	.45	18.4*	13.6	3.30						Balance	
317L**	E317L	.03	1.50	.45	18.4*	13.6	3.20						Balance	
318	E318	.05	1.75	.40	19.5*	12.5	2.30	.55					Balance	
320	E320	.04	2.25	.25	19.7*	32.9	2.15	.50			3.10*		Balance	
023	None	.04	2.25	.25	19.7*	32.9	2.15				3.10*		Balance	
330	E330	.20	2.25	.50	14.5*	34.0							Balance	
347**	E347	.05	1.20	.50	19.6*	9.8		.85					Balance	
349	E349	.10	1.20	.60	18.9*	8.7	.50	.95		1.40	.07		Balance	
410	E410	.09	.50	.40	11.8*								Balance	
410NiMo	E410NiMo	.05	.75	.40	11.7*	4.5	.50						Balance	
830	E830	.035	.45	.40	16.35*	4.75		.20		3.30*			Balance	
2209	None	.03	.95	.45	23.0*	9.7	3.0						Balance	
HP4SMod	None	.16	1.15	.40	25.8*	34.4							Balance	
N50W	E209	.04	5.50*	.40	22.0*	11.0	1.90				.23		Balance	
N35W	E240	.04	11.10*	.30	17.7*	5.2					.18		Balance	
Armorloy A-8	E307	.08	3.60	.50	20.2*	9.4	1.15						Balance	
Armorloy A-9	None	.10	1.85	.45	20.0*	9.5	2.1						Balance	

* We recommend air monitoring for these. See Sections 5 and 6 and the labels on the product containers.

** DCT and DCT-2 Electrodes have higher deposit silicon and lower deposit manganese than the typical deposit chemistries shown.

(†) MIL E-22200/2

**Table 9—McKAY SPOOLED, COILED AND CUT LENGTH SOLID STAINLESS STEEL WIRES
To AWS A5.9, Specification for Corrosion-Resisting Chromium and Chromium-Nickel Steel Bare Arc Welding Electrodes
and Welding Rods with Inert Gas Shielding or Submerged Arc Flux**

McKAY GRADE	AWS CLASS	TYPICAL DEPOSIT CHEMISTRY WITH GTA and ARGON, %											OTHER INGREDIENTS	
		Carbon C	Manganese Mn †	Silicon Si	Chromium Cr †	Nickel Ni †	Molybdenum Mo	Columbium Tantalum Cb + Ta	Copper Cu †	Vanadium V	Nitrogen N	Iron Fe		
308	ER308	.04	1.90	.45	20.5*	9.8							Balance	Only residual elements at the normal levels found in solid stainless steel wires
308L	ER308L	.017	1.80	.50	20.3*	9.7							Balance	
308L HI SII	ER308L-Si	.017	1.80	.80	20.3*	9.7							Balance	
309	ER309	.06	1.75	.50	23.7*	12.7							Balance	
309L	ER309L	.016	2.00	.45	23.7*	13.2							Balance	
309L HI SII	None	.016	2.00	.80	23.7*	13.2							Balance	
310	ER310	.10	1.80	.50	27.0*	21.1							Balance	
316	ER316	.04	1.70	.48	18.7*	12.7	2.30						Balance	
316L	ER316L	.019	1.70	.45	18.9*	12.6	2.20						Balance	
316L HI SII	ER316L-Si	.015	1.90	.80	19.0*	12.0	2.20						Balance	
317L	ER317L	.020	1.75	.45	19.0*	13.3	3.20						Balance	
320	ER320	.020	.45	.25	19.7*	33.4	2.10	.40			3.20*		Balance	
330	ER330	.20	1.75	.35	16.0*	35.0							Balance	
347	ER347	.045	1.95	.45	19.7*	9.3		.75					Balance	
410	ER410	.08	.50	.40	12.9*								Balance	
830	ER830	.030	.60	.45	16.5*	5.0	.20	.21		3.4*			Balance	
023	None	.020	.45	.25	19.7*	33.4	2.10				3.20*		Balance	
N50W	ER209	.030	6.00*	.40	21.0*	10.0	1.80			.20	.20	.22	Balance	
N35W	ER240	.030	12.00*	.40	18.0*	5.0					.15		Balance	

* We recommend air monitoring for these. See Sections 5 and 6 and the labels on the product containers.

To AWS A5.22, Specification for Flux-Cored Corrosion-Resisting Steels
with No Gas Shielding

McKAY GRADE	AWS CLASS	TYPICAL DEPOSIT CHEMISTRY, %											OTHER INGREDIENTS
		Carbon C	Manganese Mn †	Silicon Si	Chromium Cr †	Nickel Ni †	Molybdenum Mo	Columbium Tantalum Cb + Ta	Copper Cu †	Titanium Ti	Nitrogen N	Iron Fe	
308-0	E308T-3	.05	1.20	.50	20.5*	9.9						Balance	Oxides and/or fluorides (F) of: Calcium (Ca) Potassium (K) Titanium (Ti)
308L-0	E308LT-3	.02	1.20	.50	20.3*	10.2						Balance	
A9-0	None	.10	1.70	.55	20.5*	9.9	2.1					Balance	
309-0	E309T-3	.04	1.40	.50	23.8*	12.7						Balance	
309L-0	E309LT-3	.02	1.40	.50	23.8*	12.7						Balance	
309L-Mo-0	None	.02	1.40	.50	23.8*	12.7	2.2					Balance	
309CbL-0	E309CbLT-3	.02	1.20	.40	24.0*	12.9		.85				Balance	
Verticlad 9	None	.02	1.55	.30	27.7*	12.5						Balance	
310-0	E310T-3	.10	2.30	.40	26.1*	20.7						Balance	
310HC-0	None	.40	2.30	.40	26.1*	20.7						Balance	
312-0	E312T-3	.06	1.50	.30	29.5*	9.0						Balance	
316L-0	E316LT-3	.02	1.90	.50	18.9	12.0	2.4					Balance	
4K-0	None	.02	2.25	.30	17.8*	13.5	2.20					Balance	
317L-0	E317LT-3	.02	1.50	.50	20.0*	13.5	3.30					Balance	
347L-0	E347T-3	.02	1.10	.60	19.9	9.8		.60				Balance	
363-0	E410NiTiT-3	.03	.40	.40	11.3*	4.0				.40		Balance	
409-0	E409T-3	.04	.60	.60	12.0*					.70		Balance	
410-0	E410T-3	.09	.50	.30	12.0*							Balance	
410NiMo-0	E410NiMoT-3	.03	.50	.30	11.6*	4.4	.50					Balance	
430-0	E430T-3	.03	.55	.30	16.8*							Balance	
446-0	None	.02	.80	.40	26.0*							Balance	
630-0	None	.02	.60	.20	18.4*	4.7		.20		3.4*		Balance	
958HT-0	None	.02	.80	.30	25.0*	7.7	4.2				.18	Balance	
18116-0	None(1)	.02	2.00	.55	23.1*	13.0	2.9				.12	Balance	
2209-0	None	.02	1.60	.40	22.0*	8.5	3.30				.14	Balance	
259-0	None	.02	1.00	.30	25.0*	10.0	3.2			2.0*	.14	Balance	
NiCr3-0	None	.02	3.20	.20	20.0*	Balance		2.40				1.3	
NiCrMo3-0	None	.02	.20	.20	20.5*	Balance	8.40	3.50				2.0	

*We recommend air monitoring for these. See Sections 5 and 6 and the labels on the product containers.

(1) 309L-Mo-0 Modified

Table 11—McKAY IN-FLUX T1 AND T1-XHP STAINLESS STEEL FLUX CORED GAS SHIELDED WELDING WIRES
To AWS A5.22, Specification for Flux-Cored Corrosion-Resisting Chromium and Chromium-Nickel Steel Electrodes
with CO₂ or 75/25 Argon/CO₂ Shielding

McKAY GRADE	AWS CLASS	TYPICAL DEPOSIT CHEMISTRY WITH 75/25 ARGON/CO ₂ , %									OTHER INGREDIENTS
		Carbon C	Manganese Mn †	Silicon Si	Chromium Cr †	Nickel Ni †	Molybdenum Mo	Columbium Tantalum Cb + Ta	Iron Fe		
308-T1	E308T-1	.05	1.2	0.6	19.7*	9.5				Balance	Oxides and/or Fluorides (F) of: Aluminum (Al), Potassium (K), Sodium (Na), Titanium (Ti), Zirconium (Zr)
308L-T1	E308LT-1	.03	1.2	0.6	19.5*	9.5				Balance	
A9-T1	None	.09	1.4	0.6	21.0*	9.5	2.2			Balance	
309-T1	E309T-1	.05	1.2	0.6	23.5*	12.5				Balance	
309L-T1	E309LT-1	.03	1.2	0.6	24.2*	12.5				Balance	
309L-Mo-T1	None	.03	1.2	0.6	23.0*	12.5	2.3			Balance	
312-T1	E312T-1	.11	1.2	0.6	29.0*	9.0				Balance	
316L-T1	E316LT-1	.03	1.2	0.6	19.0*	12.0	2.3			Balance	
347-T1	E347T-1	.05	1.2	0.6	19.5*	9.5		.6		Balance	
410 NiMo-T1	E410NiMoT-1	.03	0.5	0.4	11.8*	4.5	.60			Balance	

*We recommend air monitoring for these. See Sections 5 and 6 and the labels on the product containers.

Table 12—McKAY IN-FLUX G/S STAINLESS STEEL METAL CORED GAS SHIELDED/SUBMERGED ARC WELDING WIRES
To AWS 5.9, Specification for Corrosion-Resisting Chromium and Chromium-Nickel Steel Bare and Composite Metal Cored . . . Arc
Welding Electrodes. For use with Inert Gas Shielding or Submerged Arc Flux.

McKAY GRADE	AWS CLASS	TYPICAL DEPOSIT CHEMISTRY WITH GMA and 99/1 Argon/Oxygen, %										OTHER INGREDIENTS
		Carbon C	Manganese Mn †	Silicon Si	Chromium Cr †	Nickel Ni †	Molybdenum Mo	Columbium Tantalum Cb + Ta	Titanium Ti	Iron Fe		
308-G/S	ER308	.06	1.40*	.40	20.5*	10.0					Balance	Oxides and/or Fluorides (F) of: Aluminum (Al) Calcium (Ca) Potassium (K) Sodium (Na) See footnote ** on Fluorides.
308L-G/S	ER308L	.02	1.70*	.40	20.0*	10.3					Balance	
A9-G/S	None	.10	1.60*	.50	19.5*	9.5	2.00				Balance	
309L-G/S	ER309L	.02	1.80*	.50	24.0*	13.0					Balance	
309L-Cb-G/S	None	.02	1.80*	.50	23.1*	12.9		.80			Balance	
309HC-G/S	None	1.20	1.80*	.40	24.0*	13.0					Balance	
309L-Mo-G/S	None	.02	1.60*	.50	23.0*	12.8	2.50				Balance	
310-G/S	ER310	.12	1.60*	.50	26.7*	21.4					Balance	
312-G/S	ER312	.12	1.80*	.50	29.0*	9.0					Balance	
316L-G/S	ER316L	.02	1.60*	.40	19.0*	12.8	2.30				Balance	
317L-G/S	ER317L	.02	1.40*	.40	19.5*	14.0	3.50				Balance	
347L-G/S	ER347	.04	1.80*	.40	21.0*	10.0		.70			Balance	
409-G/S	None	.05	.50	.30	12.0				.70		Balance	
410-G/S	ER410	.10	.40	.20	12.3						Balance	
410NiMo-G/S	ER410NiMo	.02	.50	.30	12.0	4.5	.50				Balance	
430-G/S	ER430	.06	.40	.30	16.3*						Balance	
17610-G/S	None (1)	.12	.50	.40	12.1	.55	.30				Balance	

*We recommend air monitoring for these. See Sections 5 and 6 and the labels on the product containers.

**If used submerged arc, we recommend air monitoring for fluorides, which come primarily from the flux.

(1) 17610-G/S — 410 G/S Modified for higher strength.

Table 13—McKAY HARDALLOY SURFACING COVERED ELECTRODES
Covered manual electrodes for hardsurfacing steel parts.

McKAY GRADE	TYPICAL DEPOSIT CHEMISTRY, %											OTHER INGREDIENTS
	Carbon C	Manganese Mn †	Silicon Si	Chromium Cr †	Nickel Ni †	Molybdenum Mo	Titanium Ti	Vanadium V	Tungsten W	Columbium Cb	Iron Fe	
32	.18	1.3	.6	.7		.3					Balance	Most contain oxides and/or Fluorides (F) of: Aluminum (Al) Calcium (Ca) Magnesium (Mg) Potassium (K) Sodium (Na) Titanium (Ti) Zirconium (Zr)
40TIC	3.0	1.1	.8	8.2*			1.5				Balance	
42	.17	1.8	.5	2.0		.7		.3			Balance	
44	1.7	2.2	.4	2.8*							Balance	
48	1.8	1.2	1.5	30*	3.0	1.5					Balance	
52	.6	1.4	.6	2.5		.4					Balance	
55	4.6	1.0	1.1	27*		3.5					Balance	
55TIC	6.0	2.8	1.0	13*			5.5				Balance	
58	.6	1.2	.7	5.5*		.5					Balance	
58TIC	2.0	1.8	1.3	5.0*		.5	2.7	.4		2.3	Balance	
61	.8	.5	.7	4.0*		8.0		1.1	1.1		Balance	
118	.8	16.5*	.5	5.0	.3						Balance	
119	1.0	19.5*	.5	5.0*							Balance	
120	.07	1.3	.5	23.5*	9.7						Balance	
140	3.0	.4	2.0	30*		.7					Balance	
M-932	.13	.8	.4	2.2		1.0					Balance	
Chrome-Mang	.4	14.5*	.6	14.0*	1.0	1.5		.55			Balance	

*We recommend air monitoring for these. See Sections 5 and 6 and the labels on the product containers.

Table 14—McKAY TUBE-ALLOY-O FLUX CORED OPEN ARC SURFACING WIRES
For open arc semi-automatic and automatic hardsurfacing of steel parts with no shielding gas

McKAY GRADE	TYPICAL DEPOSIT CHEMISTRY, %											OTHER INGREDIENTS
	Carbon C	Manganese Mn †	Silicon Si	Chromium Cr †	Nickel Ni †	Molybdenum Mo	Titanium Ti	Vanadium V	Tungsten W	Copper Cu †	Iron Fe	
218-0	1.0	15*	.4	3.1	.4						Balance	Most contain oxides and/or Fluorides (F) of: Aluminum (Al) Calcium (Ca) Magnesium (Mg) Potassium (K) Sodium (Na) Titanium (Ti)
219-0	1.2	20*	.6	4.5							Balance	
230-0	.95	4.2*	.5	15.3*							Balance	
240-0	3.2	1.8	1.9	15.5*							Balance	
240TIC-0	4.2	1.5	2.2	10.7			7.3				Balance	
242-0	.14	1.6	.8	2.5							Balance	
244-0	2.5	1.6	2.0	9.0		1.5				.5	Balance	
252-0	.25	1.5	.7	3.5			.7				Balance	
255-0	4.5	.9	.5	26.5*							Balance	
258-0	.45	1.4	.8	6.0*		1.5			1.5		Balance	
258TIC-0	2.1	1.3	1.8	7.0		1.6	6.0				Balance	
263-0	6.0	1.0	.5	23.0*							Balance	
511-040	.10	1.6	1.2	3.8*		.45	.8	.20			Balance	
511-045	.15	1.5	1.1	3.9*		.50	.8	.20			Balance	
829-0	1.9	13*	.6	3.0			3.5				Balance	
A43-0	5.5	0.2	1.0	22.0*	(1)						Balance	
A45-0	5.5	0.2	1.0	21.0*	(1)	6.5			1.5		Balance	
AP-0	.42	16.5*	.3	13.0*							Balance	
BU-A2	.50	18.4*	1.5	12.8*							Balance	
BU-0	.06	.9	.4	1.0			.5				Balance	
BU-CI	.07	1.0	.6				1.0				Balance	
M932-0	.11	1.3	.6	1.3		.5	.8				Balance	

*We recommend air monitoring for these. See Sections 5 and 6 and the labels on the product containers.

(1) Columbium, Cb, 6.5%

Table 15—McKAY TUBE-ALLOY-S METAL CORED SUBMERGED ARC SURFACING WIRES
For submerged arc hardsurfacing of steel parts using L-TEC 50 Flux except as noted by (1), (2) and (3)

McKAY GRADE	TYPICAL DEPOSIT CHEMISTRY WITH SPECIFIED FLUX, %											OTHER INGREDIENTS
	Carbon C	Manganese Mn †	Silicon Si	Chromium Cr †	Nickel Ni †	Molybdenum Mo	Titanium Ti	Vanadium V	Tungsten W	Columbium Cb	Iron Fe	
236-S	.15	1.6	.8		5.3	5.5					Balance	Some of these wires contain titanium dioxide (TiO ₂) and alumina (Al ₂ O ₃) see footnote * on fluorides.
242-S	.16	1.9	.8	1.6		.6		.22			Balance	
250-S (1)	.20	1.3	.8	11.0							Balance	
A250-S (2)	.19	1.0	.6	11.4							Balance	
252-S	.18	2.1	.9	3.5							Balance	
255-S	4.5	3.0	.8	29.0							Balance	
258-S (2)	.35	1.3	.8	6.2		1.6			1.3		Balance	
821-S	.16	1.2	.6	6.0		1.4			1.1		Balance	
846-S	4.0	3.5	.8	29.0							Balance	
861-S (2)	.15	0.9	.55	1.5		.55					Balance	
8620-S (2)	.17	.8	.4	.5	.5	.2					Balance	
865-S (2)	.18	1.1	.4	12.0	2.7	1.0		.2		0.2	Balance	
868-S (2)	.06	.6	.6	13.0	4.5	.9					Balance	
865-S MOD (3)	.18	1.1	.6	14.0	2.7	1.0		.18		.18	Balance	
420M-S (1)	.25	1.2	.7	14.0							Balance	
A420M-S (2)	.23	1.2	.7	14.0							Balance	
AP-S	.30	15.5	1.4	12.0	1.2	1.3		.35			Balance	
A2JL-S (2)	.04	.8	.5	12.5	2.0	1.0					Balance	
BU-S	.12	1.8	.8	.7							Balance	

*We recommend air monitoring for Fluorides, which comes from the flux. See Sections 5 and 6 and the labels on the product containers.

- (1) L-TEC 80 Flux
- (2) Lincoln 880 Flux
- (3) Oerlikon IND 24 Flux

- (1) L-TEC 80 Flux
- (2) Lincoln 880 Flux
- (3) Oerlikon IND 24 Flux

McKAY GRADE	ELECTRODE, ROD OR WIRE	TYPICAL DEPOSIT CHEMISTRY WITH SPECIFIED SHIELDING, %										OTHER INGREDIENTS	
		Carbon C	Manganese Mn †	Silicon Si	Chromium Cr †	Nickel Ni †	Molybdenum Mo	Vanadium V	Tungsten W	Cobalt Co †	Iron Fe		
McKay GP	Electrode	.06	1.0	.5	26.5*	9.0						Balance	Most contain oxides and/or Fluorides (F) of: Aluminum (Al) Calcium (Ca) Magnesium (Mg) Potassium (K) Sodium (Na) Titanium (Ti)
McKay GP-O (1)	Wire	.07	1.5	.8	30*	9.0						Balance	
Frogalloy	Electrode	.4	4.1	.5	19.2*	9.2	1.4					Balance	
Frogalloy-O (1)	Wire	.4	4.1	.5	19.2*	9.5	1.8					Balance	
McKay S7-T (2)	Wire	.5	.8	.5	3.3		1.5					Balance	
McKay HW-T (2)	Wire	.4	1.0	.6	5.0		1.5	.4	1.3			Balance	
McKay HW2-T (2)	Wire	.11	.8	.5	4.3		1.3	.4	2.0			Balance	
McKay C	Electrode	.03	.6	.4	15.5*	Balance	16.0		3.8			3.5	
McKay C-G (3)	Wire	.04	.6	.6	15.5*	Balance	16.0		3.5			3.5	
McKay C-T1 (3)	Wire	.04	.6	.6	15.5*	Balance*	16.0		4.0			3.5	
McKay C-S* (4)	Wire	.01	.8	.8	14.3	Balance	15.3		3.8			3.5	
McKay 55Ni-O	Wire	1.1	4.0	0.8		53.0						Balance*	
Tool Age 400S* (4)	Wire	.08	.8	.4	5.0		11.0				16.3	Balance	
Tool Forge 29 (3)	Wire	.07	1.3	.7	.8	1.9	.6					Balance	
Tool Forge 36 (3)	Wire	.09	1.2	.6	5.2	1.0	1.5	.3	.4			Balance	
Tool Forge 40 (3)	Wire	.08	.6	.4	5.0		11.0				16.3	Balance	
Tool Forge 855G (3)	Wire	.20	1.2	.8	10.7*	2.0	2.8	.3	.6			Balance	
Hardalloy 6-B	Rod	1.1	0.02	1.0	28.5*	1.0	0.08		4.5	Balance*		1.3	
Hardalloy 6-C	Electrode	1.3	0.03	1.3	29.3*	1.3	0.1		4.8	Balance*		1.6	
Tube-Alloy 6-G	Wire	0.9	1.4	0.90	26.0*	2.0			3.6	Balance*		4.0	
Hardalloy 21-B	Rod	.25	.5	.50	27.0*	2.5	5.5			Balance*		1.5	
Hardalloy 21-C	Electrode	.25	.8	.70	27.0*	2.5	5.0			Balance*		1.5	
Tube-Alloy 21-G	Wire	.25	.8	.50	27.0*	1.5	5.0			Balance*		2.5	

*We recommend air monitoring for these, and also for Fluorides, (primarily from the flux) on the -S wires. See Sections 5 and 6 and the labels on the product containers.

(1) with no gas shielding

(2) with Tri Mix gas shielding

(3) with CO₂ gas shielding

(4) with L-TEC 80 Flux

Table 17—McKAY CAST-ALLOY COVERED ELECTRODES FOR CAST IRON WELDING To AWS A5.15, Specification for Welding Electrodes and Rods for Cast Iron

McKAY GRADE	AWS CLASS	TYPICAL DEPOSIT CHEMISTRY, %						OTHER INGREDIENTS
		Carbon C	Manganese Mn †	Silicon Si	Copper Cu †	Iron Fe	Nickel Ni †	
Cast-Alloy	ENI-CI	1.1	.4	2.7	1.4	5.5	Balance	Oxides and/or Fluorides (F) of: Aluminum (Al), Boron (B), Calcium (Ca), Magnesium (Mg), Silicon (Si), Sodium (Na), Strontium (Sr), and Zirconium (Zr)
Cast-Alloy 60	ENIFe-CI	1.3	.5	.6		Balance	49	
Cast-Alloy T-60	ENIFe-CI	1.3	.2	.8		Balance	46	

Section 3 & 4—PHYSICAL/CHEMICAL CHARACTERISTICS, FIRE AND EXPLOSION HAZARD DATA

Physical/Chemical Characteristics: These products as shipped are nonhazardous, nonflammable, nonexplosive and nonreactive.
Fire and Explosion Hazard Data: The welding arc and sparks (spatter) can ignite combustible and flammable materials.
Rating under National Fire Protection 704: Health, 0; Flammability, 0; Reactivity, 0.

Section 5—REACTIVITY DATA—HAZARDOUS* DECOMPOSITION PRODUCTS

*The term "hazardous" should be interpreted as a term required and defined in the OSHA Hazard Communication Standard (29 CFR Part 1910. 1200) and does not necessarily imply the existence of any hazard.

These products as shipped are stable, nonhazardous, nonflammable, nonexplosive and nonreactive.

Welding fumes and gases cannot be classified simply. The composition and quality of both are dependent upon the metal being welded, the process, procedure and electrodes used. Other conditions which also influence the composition and quantity of the fumes and gases to which workers may be exposed include: coatings on the metal being welded (such as paint, plating, or galvanizing), the number of welders and the volume of the work area, the quality and amount of ventilation, the position of the welder's head with respect to the fume plume, as well as the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing activities).

Most fume ingredients are present in complex combinations, rather than as separate compounds. Excessive overexposures may produce the effects outlined in Section 6, HEALTH HAZARD DATA, for Welding Fumes (TLV of 5 mg/m³).

Some fume ingredients have low PELs/TLVs and represent special potential health hazards, described in Section 6. Teledyne McKay recommends monitoring all chemicals marked with an asterisk (*) in Section 2. Where monitoring is suggested, these chemicals are specifically shown on the product labels under the heading "Health Protection and Ventilation". As shown on the product labels in those cases, they will or may exceed their PEL/TLV before the total welding fume exceeds its TLV of 5 mg/m³.

Table 1—McKAY MILD STEEL COVERED ELECTRODES

McKAY GRADES	FUMES TO BE EXPECTED	GASES TO BE EXPECTED	RECOMMENDED AIR MONITORING (VALUE AND INGREDIENTS)
All grades, Table 1, Section 2	Complex oxide combinations of all electrode ingredients	Normally low. If any symptoms indicate the need, check for the oxides of nitrogen.	5 mg/m ³ of Welding Fume.

Table 2—McKAY MILD STEEL SOLID WELDING WIRES

McKAY GRADES	FUMES TO BE EXPECTED	GASES TO BE EXPECTED	RECOMMENDED AIR MONITORING (VALUE AND INGREDIENTS)
All grades, Table 2, Section 2	Complex oxide combinations of all wire ingredients	Normally low. If any symptoms indicate the need, check for oxides of nitrogen. If the shielding gas contains argon, also check ozone. If the shielding gas is carbon dioxide, check for carbon monoxide.	5 mg/m ³ of Welding Fume
			0.1 mg/m ³ of copper

Table 3—McKAY MILD STEEL LOW HYDROGEN COVERED ELECTRODES

McKAY GRADES	FUMES TO BE EXPECTED	GASES TO BE EXPECTED	RECOMMENDED AIR MONITORING (VALUE AND INGREDIENTS)
All grades, Table 3, Section 2	Complex oxide and fluoride combinations of all electrode ingredients	Normally low. If any symptoms indicate the need, check for gaseous fluorides and/or oxides of nitrogen.	5 mg/m ³ of Welding Fume.

Table 4—McKAY SPEED-ALLOY MILD STEEL FLUX CORED GAS SHIELDED WELDING WIRES

McKAY GRADES	FUMES TO BE EXPECTED	GASES TO BE EXPECTED	RECOMMENDED AIR MONITORING (VALUE AND INGREDIENTS)
All grades, Table 4, Section 2	Complex oxide and fluoride combinations of all electrode ingredients	Normally low. If any symptoms indicate the need, check for oxides of nitrogen and/or gaseous fluorides and/or carbon monoxide.	5 mg/m ³ of Welding Fume
			1 mg/m ³ of manganese on grades with an * on Mn in Table 4, Section 2

Table 5—McKAY LOW ALLOY LOW HYDROGEN COVERED ELECTRODES

McKAY GRADES	FUMES TO BE EXPECTED	GASES TO BE EXPECTED	RECOMMENDED AIR MONITORING (VALUE AND INGREDIENTS)
All grades, Table 5, Section 2	Complex oxide and fluoride combinations of all electrode ingredients	Normally low. If any symptoms indicate the need, check for gaseous fluorides and/or oxides of nitrogen.	5 mg/m ³ of Welding Fume
			0.05 mg/m ³ of Cr VI on grades with an * on Cr in Table 5, Section 2

Table 6—McKAY SPEED-ALLOY LOW ALLOY FLUX CORED GAS SHIELDED WELDING WIRES

McKAY GRADES	FUMES TO BE EXPECTED	GASES TO BE EXPECTED	RECOMMENDED AIR MONITORING (VALUE AND INGREDIENTS)
All grades, Table 6, Section 2	Complex oxide and fluoride combinations of all electrode ingredients	Normally low. If any symptoms indicate the need, check for oxides of nitrogen and/or gaseous fluorides and/or carbon monoxide.	5 mg/m ³ of Welding Fume
			1 mg/m ³ of manganese on grades with an * on Mn in Table 6, Section 2

Table 7—McKAY SPEED-ALLOY METAL CORED SUBMERGED ARC WELDING WIRES

McKAY GRADES	FUMES TO BE EXPECTED	GASES TO BE EXPECTED	RECOMMENDED AIR MONITORING (VALUE AND INGREDIENTS)
All grades, Table 7, Section 2	Few, mostly fluorides, but containing oxides of all metals in the wire and flux.	Normally low. If any symptoms indicate the need, check for gaseous fluorides.	5 mg/m ³ of Welding Fume
			Fluorides, 25 mg/m ³ as fluorine, all grades

Table 8—McKAY STAINLESS STEEL COVERED ELECTRODES

McKAY GRADES	FUMES TO BE EXPECTED	GASES TO BE EXPECTED	RECOMMENDED AIR MONITORING (VALUE AND INGREDIENTS)
All grades, Table 8, Section 2	Complex oxide and fluoride combinations of all electrode ingredients	Normally low. If any symptoms indicate the need, check for gaseous fluorides and/or oxides of nitrogen.	5 mg/m ³ of Welding Fume
			0.05 mg/m ³ of Cr VI on all grades in Table 8, Section 2
			0.1 mg/m ³ of copper on grades with an * on Cu in Table 8, Section 2
			1 mg/m ³ of manganese on grades with an * on Mn in Table 8, Section 2

Table 9—McKAY STAINLESS STEEL SOLID WELDING WIRES

McKAY GRADES	FUMES TO BE EXPECTED	GASES TO BE EXPECTED	RECOMMENDED AIR MONITORING (VALUE AND INGREDIENTS)
All grades, Table 9, Section 2	Complex oxide combinations of all wire ingredients	Normally low. If any symptoms indicate the need, check for ozone and/or oxides of nitrogen.	5 mg/m ³ of Welding Fume
			0.5 mg/m ³ of Cr II plus III on all grades in Table 9, Section 2
			0.1 mg/m ³ of copper on grades with an * on Cu in Table 9, Section 2
			1 mg/m ³ of manganese on grades with an * on Mn in Table 9, Section 2

Table 10—McKAY IN-FLUX O STAINLESS STEEL AND NICKEL BASE FLUX CORED OPEN ARC WELDING WIRES

McKAY GRADES	FUMES TO BE EXPECTED	GASES TO BE EXPECTED	RECOMMENDED AIR MONITORING (VALUE AND INGREDIENTS)
All grades, Table 10, Section 2	Complex oxide and fluoride combinations of all electrode ingredients	Normally low. If any symptoms indicate the need, check for oxides of nitrogen and/or gaseous fluorides and/or carbon monoxide.	5 mg/m ³ of Welding Fume
			0.05 mg/m ³ of Cr VI on all grades in Table 10, Section 2
			0.1 mg/m ³ of copper on any grade with an * on Cu in Table 10, Section 2

Table 11—McKAY IN-FLUX T1 AND T1-XHP STAINLESS STEEL FLUX CORED GAS SHIELDED WELDING WIRES

McKAY GRADES	FUMES TO BE EXPECTED	GASES TO BE EXPECTED	RECOMMENDED AIR MONITORING (VALUE AND INGREDIENTS)
All grades, Table 11, Section 2	Complex oxide and fluoride combinations of all electrode ingredients	Normally low. If any symptoms indicate the need, check for oxides of nitrogen and/or gaseous fluorides and/or carbon monoxide.	5 mg/m ³ of Welding Fume
			0.05 mg/m ³ of Cr VI on all grades in Table 11, Section 2
			0.5 mg/m ³ of Cr II plus Cr III on all grades in Table 11, Section 2

Table 12—McKAY IN-FLUX G/S STAINLESS STEEL METAL CORED GAS SHIELDED/SUBMERGED ARC WELDING WIRES

McKAY GRADES	FUMES TO BE EXPECTED	GASES TO BE EXPECTED	RECOMMENDED AIR MONITORING (VALUE AND INGREDIENTS)
All grades, Table 12, Section 2	Submerged arc Few, mostly fluorides Gas shielded Complex oxide and fluoride combinations of all electrode ingredients	Low, gaseous fluorides Normally low. If any symptoms indicate the need, check for oxides of nitrogen and/or gaseous fluorides and/or carbon monoxide and/or ozone.	2.5 mg/m ³ of fluorides on all grades in Table 12, Section 2
			5 mg/m ³ of Welding Fumes
			1 mg/m ³ of manganese on all grades with an * on Mn in Table 12, Section 2
			0.5 mg/m ³ of Cr II plus Cr III on all grades with an * on Cr in Table 12, Section 2

Table 13—McKAY HARDALLOY SURFACING COVERED ELECTRODES

McKAY GRADES	FUMES TO BE EXPECTED	GASES TO BE EXPECTED	RECOMMENDED AIR MONITORING (VALUE AND INGREDIENTS)
All grades, Table 13, Section 2	Complex oxide and fluoride combinations of all electrode ingredients	Normally low. If any symptoms indicate the need, check for the oxides of nitrogen.	5 mg/m ³ of Welding Fume
			0.05 mg/m ³ of Cr VI on all grades with an * on chromium in Table 13, Section 2
			0.5 mg/m ³ of Cr II plus Cr III on all grades where listed on product label
			1 mg/m ³ of manganese on all grades with an * on Mn in Table 13, Section 2

Table 14—McKAY TUBE-ALLOY-O FLUX CORED OPEN ARC SURFACING WIRES

McKAY GRADES	FUMES TO BE EXPECTED	GASES TO BE EXPECTED	RECOMMENDED AIR MONITORING (VALUE AND INGREDIENTS)
All grades, Table 14, Section 2	Complex oxide and fluoride combinations of all electrode ingredients	Normally low. If any symptoms indicate the need, check for the oxides of nitrogen, and/or gaseous fluorides and/or carbon monoxide.	5 mg/m ³ of Welding Fume
			1 mg/m ³ of manganese on all grades with an * on Mn in Table 14, Section 2
			0.05 mg/m ³ of Cr VI and/or 0.5 mg/m ³ of Cr II plus Cr III where chromium has an * in Table 14. Product label indicates whether Cr VI or Cr II plus III.

Table 15—McKAY TUBE-ALLOY-S METAL CORED SUBMERGED ARC SURFACING WIRES

McKAY GRADES	FUMES TO BE EXPECTED	GASES TO BE EXPECTED	RECOMMENDED AIR MONITORING (VALUE AND INGREDIENTS)
All grades, Table 15, Section 2	Few, mostly fluorides	Normally low. If any symptoms indicate the need, check for gaseous fluorides.	2.5 mg/m ³ of fluoride on all grades in Table 15, Section 2

Table 16—McKAY SPECIAL MAINTENANCE COVERED ELECTRODES, RODS AND WELDING WIRES

McKAY GRADES	FUMES TO BE EXPECTED	GASES TO BE EXPECTED	RECOMMENDED AIR MONITORING (VALUE AND INGREDIENTS) FOLLOWING APPLY TO BOTH ELECTRODES AND WIRES.
All grades, Table 16, Section 2 ELECTRODES	Complex oxide and fluoride combinations of all electrode ingredients	Normally low. If any symptoms indicate the need, check for oxides of nitrogen.	5 mg/m ³ of Welding Fume
			0.05 mg/m ³ of Cr VI on all grades with an * on chromium in Table 16, Section 2
All grades, Table 16, Section 2 WIRES	Complex oxide and fluoride combinations of all wire ingredients	Normally low. If any symptoms indicate the need, check for oxides of nitrogen and/or gaseous fluorides and/or carbon monoxide and/or ozone.	1.0 mg/m ³ of nickel on all grades with an * on the nickel in Table 16, Section 2
			5 mg/m ³ of Welding Fume
			0.05 mg/m ³ of Cr VI on all grades with an * on chromium in Table 16, Section 2

Table 17—McKAY CAST-ALLOY COVERED ELECTRODES FOR CAST IRON WELDING

McKAY GRADES	FUMES TO BE EXPECTED	GASES TO BE EXPECTED	RECOMMENDED AIR MONITORING (VALUE AND INGREDIENTS)
All grades, Table 17, Section 2	Complex oxide and fluoride combinations of all electrode ingredients	Normally low. If any symptoms indicate the need, check for oxides of nitrogen.	5 mg/m ³ of Welding Fume.

ROUTE OF ENTRY: The major route of entry of these fumes and gases is by inhalation. Where dermatitis or allergies are involved, it may also be by skin contact.

AGGRAVATION of preexisting respiratory or allergic conditions may occur in some welders. Where exposure data relating to respiratory illness to welders is available, the levels which those welders were exposed were excessively above recommended levels. Some studies have shown a higher level of lung related problems among older welders who smoked than those who did not smoke.

EMERGENCY AND FIRST AID: Remove from exposure and obtain prompt medical attention. If victim is unconscious, administer oxygen. If not breathing, resuscitate immediately. Employ first aid techniques recommended by American Red Cross.

Teledyne McKay recommends monitoring the fumes (and gases) for the components marked with an asterisk (*) in Section 2. These components are also specifically shown on the individual product labels under the heading "Health Protection and Ventilation." These are the components most likely to exceed their limits before the total welding fume exceeds its recommended limit.

MOST WELDING FUMES

For virtually all carbon steel (mild steel), most low alloy, and some special welding electrodes, the ACGIH Welding Fumes—Total Particulate (not otherwise classified) TLV of 5 mg/m³ will be exceeded well before the PEL or TLV for any individual chemical in the fume is exceeded. The welding fume may contain many of the following chemicals. These will not be listed in the detailed HEALTH HAZARD TABLE presented later in this Section because (1) they are not present in the pure form, but only as complex combinations with many of the other ingredients (they can be considered pseudo minerals) and (2) they will be below their PEL or TLV when the total welding fume reaches its TLV of 5 mg/m³. This MSDS and our product labels show all exceptions to this general rule.

Note that many of the metals and chemicals listed in the HEALTH HAZARD TABLE later in this section are also present in many or most of these welding fumes, but at levels such that the 5 mg/m³ for Welding Fumes is the critical exposure to monitor.

METAL OR CHEMICAL	SYMBOL	CAS NUMBER	METAL OR CHEMICAL	SYMBOL	CAS NUMBER	METAL OR CHEMICAL	SYMBOL	CAS NUMBER
Aluminum	Al	7429-90-5	Magnesium	Mg	7439-95-4	Strontium	Sr	7440-24-6
Aluminum oxide	Al ₂ O ₃	1344-28-1	Magnesium oxide	MgO	1309-48-4	Strontium oxide	SrO	1314-11-0
Boron	B	7440-42-8	Molybdenum	Mo	7439-98-7	Titanium	Ti	7440-32-6
Boron oxide	B ₂ O ₃	1303-86-2	Molybdenum oxide	MoO ₃	18868-43-4	Titanium oxide	TiO ₂	13463-67-7
Columbium (Niobium)	Cb (Nb)	7440-03-1	Potassium	K	7440-09-7	Tungsten	W	7440-33-7
Cb or Nb oxide	Cb ₂ O ₅ (Nb ₂ O ₅)	1313-96-8	Potassium oxide	K ₂ O	12136-47-7	Tungsten oxide	Several	39318-18-8
Calcium	Ca	7440-70-2	Silicon	Si	7440-21-3	Vanadium	V	7440-62-2
Calcium oxide	CaO	1305-78-8	Silicon oxide (amorphous)	SiO ₂	7631-86-9	Vandium oxide	V ₂ O ₅	1314-62-1
Lithium	Li	7439-93-2	Sodium	Na	7440-23-5	Zirconium	Zr	7440-67-7
Lithium oxide	Li ₂ O	12057-24-8	Sodium oxide	Na ₂ O	1313-59-3	Zirconium oxide	ZrO ₂	1314-23-4

FUMES OF SPECIAL CONCERN

Some electrodes contain alloying elements which may or do reach their PEL or TLV in the fumes before the total welding fumes reach 5 mg/m³. These special cases are shown both on the product labels for each container of electrodes and in Section 2 of this MSDS by means of an asterisk (*). (See also the latest Teledyne McKay SAFETY AND HEALTH BULLETIN (SHB-3) for a more detailed discussion.) The elements or compounds of concern are also listed in the tables in Section 5 and in the tables in this section.

OSHA (29 CFR 1910.1200) specifies that chromium VI, nickel and its compounds must be considered as carcinogens because they are so classified by NTP and/or IARC. Many of our welding products contain chromium and nickel, as shown on the Tables on pages 2 thru 7 of this MSDS. While certain chromium and nickel compounds have been clearly shown to be animal and human carcinogens, these compounds have not been found in welding fumes. We believe that there are no reliable scientific studies which show that stainless steel welders or any welders or workers exposed to alloys containing significant chromium and/or nickel run increased risks of lung cancer because of their exposure to the forms of chromium and nickel found in the fumes.

OSHA also specifies that all welding fumes and gases be considered as possible carcinogens to humans because they are so classified by IARC. We believe that consideration of all available studies shows inadequate evidence of any significant carcinogenic risk from welding fumes and gases to individuals when exposures are held within OSHA mandated limits.

HEALTH HAZARD TABLE

The following tables show the compounds which have been discussed previously and which may be encountered, their names and formulas, their CAS number, their maximum allowable exposure limits per OSHA (Values of PEL, STEL, or Ceiling effective 9/1/89, Federal Register, Volume 52, No. 12, Air Contaminants, Final Rule, Table Z-1-A) and ACGIH (Values of TLV, STEL or Ceiling), and briefly describes possible known short term and long term health effects which may result from excessive exposure. (Sources—McKay Health Hazard Determination, TSCA list for CAS numbers, NIOSH/OSHA Pocket Guide to Chemical Hazards, and ACGIH Documentation of the Threshold Limit Values)

NAME OF COMPOUND, FORMULA AND CAS NUMBER	ALLOWABLE EXPOSURE LIMIT AS ELEMENT UNLESS OTHERWISE INDICATED. PEL, STEL, CEILING, OR TLV.	ON ANY CARCINOGENS LIST? IF SO, WHICH ONES?	POTENTIAL HEALTH EFFECTS RESULTING FROM EXCESSIVE OVEREXPOSURES	
			Acute (Short Term)	Chronic (Cumulative Long Term)
WELDING FUMES AND COMPONENTS OF WELDING FUMES				
Welding Fumes (Not otherwise classified)	PEL — 5 mg/m ³	Yes IARC	May include metallic taste, nausea, tightness of chest, fever, dizziness, dryness or irritation of eyes, nose or throat.	Excessive levels may cause bronchial asthma, lung fibrosis, pneumoconiosis or "siderosis"
CAS No. — none	TLV — 5 mg/m ³	See comments on page 10 under FUMES OF SPECIAL CONCERN. See also gases shown later in this table—Some of the above effects may come from the gases present.		

NAME OF COMPOUND, FORMULA AND CAS NUMBER	ALLOWABLE EXPOSURE LIMIT AS ELEMENT UNLESS OTHERWISE INDICATED. PEL, STEL, CEILING, OR TLV.	ON ANY CARCINOGENS LIST? IF SO, WHICH ONES?	POTENTIAL HEALTH EFFECTS RESULTING FROM EXCESSIVE OVEREXPOSURES	
			Acute (Short Term)	Chronic (Cumulative Long Term)
WELDING FUMES AND COMPONENTS OF WELDING FUMES				
The following specific fume components are listed roughly in their order of their estimated importance in terms of frequency of occurrence and/or potential hazard.				
Manganese—Mn CAS no. 7439-96-5 Manganese dioxide— MnO ₂ CAS No. 1313-13-9	PEL — 1 mg/m ³ STEL — 3 mg/m ³ TLV for fume — 1 mg/m ³ as Mn	No	Can include metal fume fever, dry throat, coughing, tight chest, low back pain, vomiting, fatigue, headache.	"Manganism". Sensitivity varies. Affects central nervous system. Muscular weakness, tremors, symptoms similar to Parkinson's disease. Exposed employees should get quarterly medical examinations for manganism.
Chromium VI—Cr VI Sodium Chromate Na ₂ CrO ₄ (soluble) CAS No. 7775-11-3 Potassium Chromate K ₂ CrO ₄ (soluble) CAS No. 7789-00-6	PEL — 1 mg/10m ³ as CrO ₄ which equals 0.05 mg/m ³ as Cr VI. TLV — 0.05 mg/m ³	Yes IARC NTP	Allergic reaction in some people. Irritation of mucous membranes.	Compounds are dissolved, and excreted or modified to Cr II or Cr III.
See comments on page 10 under FUMES OF SPECIAL CONCERN.				
Chromium—Cr CAS No. 7440-47-3 Chromium oxide (Cr II) CrO CAS No. 12018-00-7 Chromium oxide (Cr III) Cr ₂ O ₃ CAS No. 1308-38-9	Present as oxides PEL — 0.5 mg/m ³ TLV — 0.5 mg/m ³	No	Allergic reaction in some people.	None known.
Nickel—Ni CAS No. 7440-02-0 Nickel oxide—NiO CAS No. 1313-99-1	PEL — 1 mg/m ³ TLV — 1 mg/m ³	Yes IARC NTP	Allergic reactions in some people. Metallic taste, nausea, tightness in chest, metal fume fever.	None known.
See comments on page 10 under FUMES OF SPECIAL CONCERN.				
Calcium Fluoride CaF ₂ (insoluble) CAS No. 7789-75-5 Sodium Fluoride Na F (soluble) CAS No. 7681-49-4 Potassium Fluoride K F (soluble) CAS No. 7789-23-3 Aluminum Fluoride Al F ₃ (insoluble) CAS No. 7784-18-1 Lithium Fluoride Li F (slightly soluble) CAS No. 7789-24-4	PEL — 2.5 mg/m ³ (as fluorine) TLV — 2.5 mg/m ³ (as fluorine)	No	CaF ₂ probably inert. Soluble fluorides may be irritants and corrosive to mucous membranes.	Soluble portions may cause osteoporosis and mottling of teeth, but effects seem reduced in presence of iron as in welding electrode fume.
Iron—Fe CAS No. 7439-89-6 Iron Oxide—FeO CAS No. 1345-25-1 Iron Oxide—Fe ₂ O ₃ CAS No. 1309-37-1 Iron Oxide—Fe ₃ O ₄ CAS No. 1309-38-2	Use the PEL/TLV for welding fume. You will exceed it before you exceed the Fe TLV of 5.0 mg/m ³	No	Probably none, except as nuisance dust.	Possible siderosis if exposures are excessive and long term. Regarded as benign. Lungs clear gradually after exposure is ended.
Copper—Cu CAS No. 7440-50-8 Copper oxide—CuO CAS No. 1317-38-0	PEL — 0.1 mg/m ³ for fume TLV — 0.2 mg/m ³ for fume	No	Metal fume fever, muscle ache, respiratory irritant.	None known.
Cobalt—Co CAS No. 7440-48-4 Cobalt Oxide—CoO CAS No. 1307-9606	PEL — 0.05 mg/m ³ TLV — 0.05 mg/m ³	No	Pulmonary irritant, cough, dermatitis.	Possible lung fibrosis and respiratory hypersensitivity.

NAME OF COMPOUND, FORMULA AND CAS NUMBER	ALLOWABLE EXPOSURE LIMIT AS ELEMENT UNLESS OTHERWISE INDICATED. PEL, STEL, CEILING, OR TLV.	ON ANY CARCINOGENS LIST? IF SO, WHICH ONES?	POTENTIAL HEALTH EFFECTS RESULTING FROM EXCESSIVE OVEREXPOSURES	
			Acute (Short Term)	Chronic (Cumulative Long Term)
GASES GENERATED BY OR PRESENT IN ARC WELDING PROCESSES				
Fluorides, such as Silicon Tetrafluoride SiF ₄ CAS No. 7783-61-1 Hydrogen fluoride HF CAS No. 7664-39-3	See soluble fluorides portion under Welding Fumes.			
Nitric oxide—NO CAS No. 10102-43-9	PEL — 25 ppm (30 mg/m ³) TLV — 25 PPM	No	Irritant to mucous membranes, drowsiness.	Chronic respiratory disease.
Nitrogen dioxide NO ₂ CAS No. 10102-44-0	STEL (OSHA) — 1 ppm (1.8 mg/m ³) TLV — 3 ppm	No	Irritant to mucous membranes, coughing, chest pain, pulmonary edema.	Chronic respiratory disease.
Ozone—O ₃ CAS No. 10028-15-6	PEL—0.1 ppm (0.2 mg/m ³) STEL (OSHA) — 0.3 ppm CEILING (ACGIH) -0.1 ppm	No	Irritant to mucous membranes, pulmonary edema.	Chronic respiratory disease.
Carbon monoxide—CO CAS No. 630-08-0	PEL—35 ppm (40 mg/m ³) CEILING (OSHA) — 200 ppm (229 mg/m ³)	No	Headache, rapid breathing, oxygen deprivation, confusion, dizziness, weakness	Oxygen deprivation.
Argon—A Carbon dioxide—CO ₂ Helium—He Nitrogen — N ₂	Regarded as simple asphyxiants	No	Inert gases which may replace air and deprive the body of oxygen. CO ₂ is not inert but effect is as above. TWA — 10,000 ppm (18,000 mg/m ³) STEL — 30,000 ppm (54,000 mg/m ³)	

Section 7 & 8 — PRECAUTIONS FOR SAFE HANDLING AND USE / CONTROL MEASURES

Welding hazards are complex. Available accident and health records show that the great majority of the recorded problems result from physical accidents (sometimes due to electric shock or restricted visibility/mobility), physical strains, radiation burns such as eye "flash", heat burns due to hot metal or spatter, or metal fume fever.

Read and understand the manufacturer's instructions and the precautionary label on the product. See American National Standard Z49.1, Safety in Welding and Cutting published by the American Welding Society, P.O. Box 351040, Miami, FL 33135, the OSHA Publication 2206 (29CFR1910), US Government Printing Office, Washington, D.C. 20402 and the McKay SAFETY AND HEALTH BULLETIN of July 1986, August 1986 or later for more detail on many of the following.

EXPOSURES: Maintain all exposures below the limits shown on the warning on the package and on the product label. Use industrial hygiene air monitoring to ensure acceptable exposures. The air monitoring methods given in AWS F1.1 (latest edition) "Method of Sampling Airborne Particulates Generated by Welding and Allied Processes" and AWS F1.5 (latest edition) "Methods for Sampling and Analyzing Gases from Welding and Allied Processes." are considered appropriate for air monitoring. An overall strategy for air monitoring is given in AWS F1.3 (latest edition) "Evaluating Contaminants in the Welding environment - A Sampling Strategy Guide."

VENTILATION: Use enough ventilation, local exhaust at the arc, or both, to keep the fumes and gases from the worker's breathing zone and the general area. Train the welder to keep his head out of the fumes. If fumes are removed by filtration or some other means and the air/gas stream put back in the room, the toxic gas levels may build up to undesirable levels. Toxic gases should be monitored, and/or be removed by some effective supplementary device, and/or reduced by general ventilation.

RESPIRATORY PROTECTION: Use respirable fume respirator or air supplied respirator when welding in confined space or where local exhaust or ventilation does not keep exposure below the PEL or TLV.

EYE PROTECTION: Wear helmet or use face shield. As a rule of thumb, start with a shade that is too dark to see the weld zone. Then go to a lighter shade (a lower number shade) which gives sufficient view of the weld zone. See Z49.1 mentioned earlier in this section if more details are needed.

PROTECTIVE CLOTHING: Wear hand, head, and body protection which help to prevent injury from radiation, sparks, and electrical shock. See Z49.1. At a minimum this includes welder's gloves and a protective face shield, and may include arm protectors, aprons, hats shoulder protection, as well as dark substantial clothing.

ELECTRICAL: Train welder to avoid electrical shock by maintaining a dry work area, insulating himself from work and ground, and not touching live electrical parts.

WASTE DISPOSAL: Dispose of fume or flux or welding grinding residues from the work area or from filters in accordance with EPA or local regulations. Refer to Section 2 for information on components in the flux and to Sections 5 and 6 for information on components in the fumes.

Section 9 — SECTION 313 SUPPLIER NOTIFICATION

The chemicals reportable by Section 313 of the Emergency Planning and Community Right-to-Know Act (Title III of the Superfund Amendments and Reauthorization Act of 1986) are marked by the symbol † in Section 2, Tables 1 through 17. Refer to Section 2 for the percent of the chemical(s) in a particular product. Refer to the Tables in Section 6 for the CAS Number of reportable chemicals.

Teledyne McKay believes this information to be accurate and to reflect qualified expert opinion regarding research available to this date. However, Teledyne McKay cannot make any express or implied warranty as to this information.

 **TELEDYNE McKay**

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MATERIAL SAFETY DATA SHEET
24 Hour Emergency Telephone Number - CHEMTREC 1-800-424-9300
THIS MSDS COMPLIES WITH 29 CFR 1910.1200
(THE HAZARD COMMUNICATION STANDARD)

-----SECTION I - PRODUCT IDENTIFICATION-----

PRODUCT NAME: 20
GENERIC ID: KETONE
DOT HAZARD CLASSIFICATION: 3 (FLAMMABLE LIQUID)
DATE PREPARED: 10/16/96

-----SECTION II - COMPONENTS-----

NO.	COMPOSITION	CAS NUMBER	PERCENT
P	METHYL ETHYL KETONE	78-93-3	100

NFPA HAZARD RATING: HEALTH 1 FIRE 3 REACTIVITY 0

ACUTE TOXICITY DATA

NO.	ACUTE ORAL LD50	ACUTE DERMAL LD50	ACUTE INHALATION LC50
P	2.9 G/KG (RAT)	15 G/KG (RABBIT)	5000 PPM/BH (RAT)

-----SECTION III - PHYSICAL DATA-----

BOILING POINT: 175 (DEG F) SPECIFIC GRAVITY: 0.81 (H2O=1) VAPOR PRESSURE: 70.9 @ 68 DEG. F (MM HG)
MELTING POINT: -124 (DEG F) SOLUBILITY: APPRECIABLE (IN WATER) VAPOR DENSITY: 2.5 (AIR=1)
EVAPORATION RATE (N-BUTYL ACETATE = 1): 3.8 VOC: 100% 6.67 LB/GL

APPEARANCE AND ODOR:
COLORLESS, MOBILE LIQUID, PUNGENT ODOR.

-----SECTION IV - FIRE AND EXPLOSION INFORMATION-----

FLASH POINT AND METHOD: FLAMMABLE LIMITS % VOLUME IN AIR
EG. F (TCC) LOWER: 1.8 UPPER: 11.5

EXTINGUISHING MEDIA
WATER FOG, "ALCOHOL" FOAM, DRY CHEMICAL OR CO2.

SPECIAL FIRE FIGHTING PROCEDURES AND PRECAUTIONS
WARNING: FLAMMABLE. CLEAR FIRE AREA OF UNPROTECTED PERSONNEL. DO NOT ENTER CONFINED FIRE SPACE WITHOUT FULL BUNKER GEAR (HELMET WITH FACE SHIELD, BUNKER COATS, GLOVES AND RUBBER BOOTS), INCLUDING A POSITIVE PRESSURE NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER.

UNUSUAL FIRE AND EXPLOSION HAZARDS
CONTAINERS EXPOSED TO INTENSE HEAT FROM FIRES SHOULD BE COOLED WITH WATER TO PREVENT VAPOR PRESSURE BUILDUP WHICH COULD RESULT IN CONTAINER RUPTURE. CONTAINER AREAS EXPOSED TO DIRECT FLAME CONTACT SHOULD BE COOLED WITH LARGE QUANTITIES OF WATER AS NEEDED TO PREVENT WEAKENING OF CONTAINER STRUCTURE.

-----SECTION V - HEALTH AND HAZARD DATA-----

EYE CONTACT
IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION.

SKIN CONTACT
FLUSH SKIN WITH WATER WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. IF IRRITATION OCCURS, GET MEDICAL ATTENTION. DO NOT REUSE CLOTHING OR SHOES UNTIL CLEANED.

INHALATION
REMOVE VICTIM TO FRESH AIR AND PROVIDE OXYGEN IF BREATHING IS DIFFICULT. GIVE ARTIFICIAL RESPIRATION IF NOT BREATHING. GET MEDICAL ATTENTION.

INGESTION
DO NOT GIVE LIQUIDS IF VICTIM IS UNCONSCIOUS OR DROWSY. OTHERWISE GIVE NO MORE THAN 2 GLASSES OF WATER AND INDUCE VOMITING BY GIVING 30CC (2 TABLESPOONS) SYRUP OF IPECAC. * IF IPECAC IS UNAVAILABLE, GIVE 2 GLASSES OF WATER AND INDUCE VOMITING BY TOUCHING FINGER TO BACK OF VICTIM'S THROAT. KEEP VICTIM'S HEAD BELOW HIPS WHILE VOMITING. GET MEDICAL ATTENTION.

NOTE TO PHYSICIAN
*IF VICTIM IS A CHILD, GIVE NO MORE THAN 1 GLASS OF WATER AND 15CC (1 TABLESPOON) SYRUP OF IPECAC. IF SYMPTOMS SUCH AS A LOSS OF GAG REFLEX, CONVULSIONS OR UNCONSCIOUSNESS OCCUR BEFORE EMESIS, GASTRIC LAVAGE SHOULD BE CONSIDERED FOLLOWING INTUBATION WITH A CUFFED ENDOTRACHEAL TUBE.

THE HEALTH EFFECTS NOTED BELOW ARE CONSISTENT WITH REQUIREMENTS UNDER THE OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200).

EYE CONTACT
LIQUID IS MILDLY IRRITATING TO THE EYES. HIGH VAPOR CONCENTRATIONS MAY ALSO BE IRRITATING.

SKIN CONTACT
LIQUID IS MODERATELY IRRITATING TO THE SKIN. PROLONGED OR REPEATED LIQUID CONTACT CAN RESULT IN DEFATTING AND DRYING OF THE SKIN WHICH MAY RESULT IN SKIN IRRITATION AND DERMATITIS.

INHALATION
VAPORS MAY CAUSE IRRITATION TO NOSE, THROAT AND RESPIRATORY TRACT. HIGH VAPOR CONCENTRATIONS MAY CAUSE CNS DEPRESSION.

INGESTION
LIQUID IS MODERATELY TOXIC AND MAY BE HARMFUL IF SWALLOWED; MAY PRODUCE CNS DEPRESSION.

SIGNS AND SYMPTOMS
EXPOSURE AS NOTED ABOVE. EARLY TO MODERATE CNS (CENTRAL NERVOUS SYSTEM) DEPRESSION MAY BE EVIDENCED BY GIDDINESS, HEADACHE, DIZZINESS AND NAUSEA; IN EXTREME CASES, UNCONSCIOUSNESS AND DEATH MAY OCCUR.

AGGRAVATED MEDICAL CONDITIONS
PREEXISTING EYE, SKIN, AND RESPIRATORY DISORDERS MAY BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT.

IN PREGNANT FEMALE RODENTS EXPOSED BY INHALATION TO HIGH CONCENTRATIONS OF METHYL ETHYL KETONE (MEK) VAPOR (15X THE OSHA PEL/TWA) MINOR DEVELOPMENTALLY TOXIC EFFECTS TO THE FETUSES WERE OBSERVED.

HAS BEEN DEMONSTRATED TO POTENTIATE (I.E. SHORTEN THE TIME OF ONSET) THE PERIPHERAL NEUROPATHY CAUSED BY EITHER N-HEXANE OR ETHYL N-BUTYL KETONE. MEK BY ITSELF HAS NOT BEEN DEMONSTRATED TO CAUSE PERIPHERAL NEUROPATHY.

CAN POTENTIATE THE NEUROTOXICITY OF HEXACARBON COMPOUNDS (N-HEXANE, METHYL-N-BUTYLKETONE, AND 2, 5-HEXANEDIONE) AND THE LIVER AND KIDNEY TOXICITY OF HALOALKANE SOLVENTS.

-----SECTION VI-REACTIVITY DATA-----

STABILITY: STABLE

CONDITIONS AND MATERIALS TO AVOID:
AVOID HEAT, SPARKS, FLAME AND CONTACT WITH STRONG OXIDIZING AGENT.

HAZARDOUS DECOMPOSITION PRODUCTS
CARBON MONOXIDE AND UNIDENTIFIED ORGANIC COMPOUNDS MAY BE FORMED DURING COMBUSTION. ONE HAZARDOUS COMBUSTION PRODUCT, METHYL VINYL KETONE HAS BEEN FOUND IN THE COMBUSTION ZONE OF A PLANT INCINERATOR BURNING WASTE MEK. THIS INFORMATION WAS SUPPLIED TO EPA UNDER FY17 OTS-0189-0661 BY HERCULES, INC.

-----SECTION VII-SPILL OR LEAK PROCEDURES-----

SPILL OR LEAK PROCEDURES
WARNING: FLAMMABLE. ELIMINATE ALL IGNITION SOURCES. HANDLING EQUIPMENT MUST BE GROUNDED TO PREVENT SPARKING. ***LARGE SPILLS*** EVACUATE THE HAZARD AREA OF UNPROTECTED PERSONNEL. WEAR APPROPRIATE RESPIRATOR AND PROTECTIVE CLOTHING. SHUT OFF SOURCE OF LEAK ONLY IF SAFE TO DO SO. DIKE AND CONTAIN. IF VAPOR CLOUD FORMS WATER FOG MAY BE USED TO SUPPRESS. CONTAIN RUN-OFF. REMOVE WITH VACUUM TRUCKS OR PUMP TO STORAGE/SALVAGE VESSELS. SOAK UP RESIDUE WITH AN ABSORBENT SUCH AS CLAY, SAND OR OTHER SUITABLE MATERIAL. PLACE IN NON-LEAKING CONTAINERS FOR PROPER DISPOSAL. FLUSH AREA WITH WATER TO REMOVE TRACE. DISPOSE OF FLUSH SOLUTIONS AS ABOVE. ***SMALL SPILLS*** TAKE UP WITH AN ABSORBENT MATERIAL AND PLACE IN NON-LEAKING CONTAINERS; SEAL TIGHTLY FOR PROPER DISPOSAL.

-----SECTION VIII-PROTECTIVE EQUIPMENT TO BE USED-----

RESPIRATORY PROTECTION
AVOID PROLONGED OR REPEATED BREATHING OF VAPORS. IF EXPOSURE MAY OR DOES EXCEED OCCUPATIONAL EXPOSURE LIMITS (SEC. IV) USE A NIOSH-APPROVED RESPIRATOR TO PREVENT OVEREXPOSURE. IN ACCORD WITH 29 CFR 1910.134 USE EITHER A FULL-FACE, ATMOSPHERE-SUPPLYING RESPIRATOR OR AN AIR-PURIFYING RESPIRATOR FOR ORGANIC VAPORS.

PROTECTIVE CLOTHING
AVOID CONTACT WITH EYES. WEAR CHEMICAL GOGGLES IF THERE IS LIKELIHOOD OF CONTACT WITH EYES. AVOID PROLONGED OR REPEATED CONTACT WITH SKIN. WEAR CHEMICAL-RESISTANT GLOVES AND OTHER CLOTHING AS REQUIRED TO MINIMIZE CONTACT. TEST DATA FROM PUBLISHED LITERATURE AND/OR GLOVE AND CLOTHING*

ADDITIONAL PROTECTIVE MEASURES
*MANUFACTURERS INDICATE THE BEST PROTECTION IS PROVIDED BY BUTYL. USE EXPLOSION-PROOF VENTILATION AS REQUIRED TO CONTROL VAPOR CONCENTRATIONS. AIR-DRY CONTAMINATED CLOTHING IN A WELL VENTILATED AREA, THEN LAUNDRER BEFORE REUSING.

-----SECTION IX-SPECIAL PRECAUTIONS OR OTHER COMMENTS-----

P. LIGHTS AND VAPOR AWAY FROM HEAT, SPARKS OR FLAME. EXTINGUISH PILOT LIGHTS, CIGARETTES AND TURN OFF OTHER SOURCES OF IGNITION PRIOR TO USE AND UNTIL ALL VAPORS ARE GONE. VAPORS MAY ACCUMULATE AND TRAVEL TO IGNITION SOURCES DISTANT FROM THE LING SITE; FLASH-FIRE CAN RESULT. KEEP CONTAINERS CLOSED WHEN NOT IN USE. USE WITH ADEQUATE VENTILATION.

AINERS, EVEN THOSE THAT HAVE BEEN EMPTIED, CAN CONTAIN EXPLOSIVE VAPORS. DO NOT CUT, DRILL, GRIND, WELD OR PERFORM SIMILAR ATIONS ON OR NEAR CONTAINERS. DO NOT PRESSURIZE DRUM CONTAINERS TO EMPTY THEM.

STATIC ELECTRICITY MAY ACCUMULATE AND CREATE A FIRE HAZARD. GROUND FIXED EQUIPMENT. BOND AND GROUND TRANSFER CONTAINERS AND EQUIPMENT.

WASH WITH SOAP AND WATER BEFORE EATING, DRINKING, SMOKING, APPLYING COSMETICS, OR USING TOILET FACILITIES. LAUNDRER CONTAMINATED CLOTHING BEFORE REUSE. AIR-DRY CONTAMINATED CLOTHING IN A WELL VENTILATED AREA BEFORE LAUNDERING.

TRANSPORTATION REQUIREMENTS

DEPARTMENT OF TRANSPORTATION CLASSIFICATION:
CLASS 3, FLAMMABLE LIQUID, II

D.O.T. PROPER SHIPPING NAME:
METHYL ETHYL KETONE (OR ETHYL METHYL KETONE)

OTHER REQUIREMENTS:
UN1193, GUIDE 26

THIS PRODUCT IS LISTED ON THE EPA/TSCA INVENTORY OF CHEMICAL SUBSTANCES

PROTECTION OF STRATOSPHERIC OZONE (PURSUANT TO SECTION 611 OF THE CLEAN AIR ACT AMENDMENTS OF 1990): PER 40 CFR PART 8, THIS PRODUCT DOES NOT CONTAIN NOR WAS IT DIRECTLY MANUFACTURED WITH ANY CLASS I OR CLASS II OZONE DEPLETING SUBSTANCES.

IN ACCORDANCE WITH SARA TITLE III, SECTION 313, THE ENVIRONMENTAL DATA SHEET (EDS) SHOULD ALWAYS BE COPIED AND SENT WITH THE MSDS.

CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED. SINCE EMPTIED CONTAINERS RETAIN PRODUCT RESIDUES (VAPOR, LIQUID, AND/OR SOLID), ALL HAZARD PRECAUTIONS GIVEN IN THE DATA SHEET MUST BE OBSERVED.

WARNING!!! SUDDEN RELEASE OF HOT ORGANIC CHEMICAL VAPORS OR MISTS FROM PROCESS EQUIPMENT OPERATING AT ELEVATED TEMPERATURE AND PRESSURE, OR SUDDEN INGRESS OF AIR INTO VACUUM EQUIPMENT, MAY RESULT IN IGNITIONS WITHOUT THE PRESENCE OF OBVIOUS IGNITION SOURCES. PUBLISHED "AUTOIGNITION" OR "IGNITION" TEMPERATURE VALUES CANNOT BE TREATED AS SAFE OPERATING TEMPERATURES IN CHEMICAL PROCESSES WITHOUT ANALYSIS OF THE ACTUAL PROCESS CONDITIONS. ANY USE OF THIS PRODUCT IN ELEVATED TEMPERATURE PROCESSES SHOULD BE THOROUGHLY EVALUATED TO ESTABLISH AND MAINTAIN SAFE OPERATING CONDITIONS.

-----DISCLAIMER-----

THE INFORMATION, RECOMMENDATIONS AND SUGGESTION HEREIN WERE COMPILED FROM REFERENCE MATERIAL AND OTHER SOURCES BELIEVED TO BE RELIABLE. HOWEVER, THE MSDS'S ACCURACY OR COMPLETENESS IS NOT GUARANTEED BY THIS COMPANY, NOR IS ANY RESPONSIBILITY ASSUMED OR IMPLIED FOR ANY LOSS OR DAMAGE RESULTING FROM INACCURACIES OR OMISSIONS. SINCE CONDITIONS OF USE ARE BEYOND OUR CONTROL, NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSED OR IMPLIED.

THE INFORMATION ACCUMULATED HEREIN IS BELIEVED TO BE ACCURATE BUT IS NOT WARRANTED TO BE WHETHER ORIGINATING WITH THE COMPANY OR NOT. RECIPIENTS ARE ADVISED TO CONFIRM IN ADVANCE OF NEED THAT THE INFORMATION IS CURRENT, APPLICABLE, AND SUITABLE TO THEIR INSTANCES.
APRIATE WARNINGS AND SAFE HANDLING PROCEDURES SHOULD BE PROVIDED TO HANDLERS AND USERS.
END

Material Safety Data Sheet



Emergency Medical Telephone (800) 441-3637

NO. 2 DIESEL FUEL/FURNACE OIL/DIESEL FUEL LC/ FURNACE OIL LP/NO. 2 FUEL OIL/NO. 2 DIESEL FUEL LS

I. MATERIAL IDENTIFICATION

Name No. 2 Diesel Fuel/Furnace Oil/ Diesel Fuel LC/Furnace Oil LP/ No. 2 Fuel Oil/No. 2 Diesel Fuel LS	CAS Registry Number Mixture; See Section XI	Transportation Emergency Phone 1-(800) 424-9300 (Chemtrec)
Chemical Family Mixed Hydrocarbons	Product Code 3503/3504/3508/3510/3542/4142/4198	

II. OSHA HAZARD DETERMINATION

The material is hazardous as defined by OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Refer to Section XI of this MSDS for federal and state regulatory information.

Hazardous Ingredients	CAS Registry Number	Concentration
Hydrocarbons (Aromatic & Paraffinic)	Mixture	> 90%
Naphthalene	91-20-3	Approx. 3%

Hazardous Physical Properties
Class II Combustible Liquid - NFPA 30-1987.

III. PHYSICAL DATA

Appearance and Odor Clear or light yellow liquid; Aromatic odor	Specific Gravity (H₂O = 1) 0.85 - 0.93
Boiling Point/Range 350° - 680°F	% Volatiles (by volume) Nil
Vapor Pressure (mmHg), 68°F 1	Solubility in Water Insoluble
Vapor Density (Air = 1.0) > 1	

IV. REACTIVITY DATA

Stable: X Unstable:

Hazardous Decomposition Materials: Incomplete combustion may produce carbon monoxide.

Conditions to Avoid: Oxidizing materials, heat, flame.

Hazardous Polymerization: Will not occur.

GASC0220/October 1990

1

*MBO
PST# 132845*

Conoco Inc., P.O. Box 2197, Houston, TX 77252
General Information No. (713) 293-5550

General Information No. (713) 293-5550

Signs and Symptoms of Exposure/Medical Conditions Aggravated by Exposure:

It is highly unlikely that human exposure at or below the recommended exposure level poses a significant health hazard. In this regard, good workplace practices and proper engineering designs will minimize exposure. Animal studies show that prolonged or repeated inhalation exposure to high concentrations of some petroleum distillates has caused liver tumors in mice and adverse kidney effects in male rats. However, kidney effects were not seen in similar studies involving female rats, guinea pigs, dogs, or monkeys. Also, human studies do not indicate this peculiar sensitivity for kidney damage. The significance of liver tumors in mice is highly speculative and not a good indicator for predicting a potential human health hazard.

Mouse skin painting studies have shown that petroleum middle distillates (boiling range of 100°-700°F; naphtha, jet fuel, diesel fuel, kerosene, etc.) can cause skin cancer when repeatedly applied and never washed from the animal's skin. The relative significance of this to human health is uncertain since the petroleum distillates were not washed from the skin and resulting skin effects (irritation, cell damage, etc.) may play a role in the tumorigenic response. A few studies have shown that washing the animal's skin with soap and water between treatments greatly reduces the carcinogenic effect of some petroleum oils.

Studies in mice and rats have shown that chronic exposure (8 hours/day, 7 days/week, 24 months) to unfiltered diesel exhaust produced tumors of the lung and also lymphomas. On the basis of these studies, NIOSH recommends that whole diesel exhaust be regarded as a potential carcinogen.

The product contains petroleum hydrocarbons, and as with many petroleum products, it may cause irritation to the eyes, lungs or skin after prolonged or repeated exposure. Extreme exposure or aspiration into the lungs may cause pneumonia. Overexposure may cause weakness, headache, nausea, confusion, blurred vision, drowsiness and other nervous system effects; greater exposure may cause dizziness, slurred speech, flushed face, unconsciousness or convulsions.

Naphthalene is a potential irritant to eyes, skin and lungs and may damage the blood, eyes and kidney after prolonged or repeated exposure.

Carcinogenicity:

This material is not known to contain any chemical listed as a carcinogen or suspected carcinogen by OSHA, IARC, or NTP at a concentration greater than 0.1%.

VIII. EMERGENCY AND FIRST AID INFORMATION

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

Skin: In case of contact, immediately wash skin with soap. Wash contaminated clothing before reuse. If irritation develops, consult a physician.

Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion: If swallowed, do not induce vomiting. Immediately give two glasses of water. Never give anything by mouth to an unconscious person. Call a physician.

Notes to Physician: Activated charcoal slurry may be administered. To prepare activated charcoal slurry, suspend 50 grams activated charcoal in 400mL water and mix thoroughly. Administer 5mL/kg, or 350mL, for an average adult.

IX. SPILL, LEAK AND DISPOSAL INFORMATION

In Case of Spill or Leak: Dike spill. Prevent liquid from entering sewers, waterways, or low areas. Soak up with sawdust, sand, oil dry, or other absorbent material. Shovel or sweep up. Remove source of heat, sparks, flame, impact, friction, and electricity, including internal combustion engines and power tools. If equipment is used for spill cleanup, it must be explosion-proof and suitable for flammable liquid and vapors.

NOTE: Vapors released from the spill may create an explosive atmosphere.

NOTE: Review FIRE AND EXPLOSION HAZARDS before proceeding with clean up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean up.

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA), 40 CFR 261, SUBPART C AND D
The material, when discarded or disposed of, is not specifically listed as a hazardous waste in Federal regulations; however, it could be considered hazardous if it meets criteria for being toxic, corrosive, ignitable or reactive according to the U.S. EPA definitions (40 CFR 261). This material could also become a hazardous waste if it is mixed with or comes in contact with a listed hazardous waste. If it is a hazardous waste, regulations 40 CFR 262-266 and 268 may apply.

**FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 116.4A
SECTION 311**

The material contains the following ingredient(s) which is considered hazardous if spilled in navigable waters.

<u>Ingredient</u>	<u>Reportable Quantity</u>
Petroleum Hydrocarbon	Film or sheen upon or discoloration of the water surface or adjoining shoreline

HAZARDOUS MATERIALS TRANSPORTATION REGULATIONS, 49 CFR 171-178
Not Applicable

FOREIGN REGULATIONS

CANADIAN HAZARDOUS PRODUCTS ACT (WHMIS)

The material is a WHMIS Controlled Product and a Canadian MSDS is available.

STATE REGULATIONS

**CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986
(PROPOSITION 65)**

The material is not known to contain ingredient(s) subject to the Act.

PENNSYLVANIA WORKER AND COMMUNITY RIGHT TO KNOW ACT

The material contains the following hazardous substances:

Categories: H = Hazardous Substance ($\geq 1.0\%$)
S = Special Hazardous Substance ($\geq 0.01\%$)
E = Environmental Hazard ($\geq 1.0\%$)

<u>Ingredient</u>	<u>CAS Registry Number</u>	<u>Category</u>
Aromatic & Paraffinic Hydrocarbons	Mixture	H
Naphthalene	91-20-3	E

Nonhazardous ingredient(s) information is withheld as trade secret in accordance with Section 11 of Pennsylvania Worker and Community Right to Know Act.

SECTIONS OF MSDS REVISED:

DATE OF LATEST REVISION/REVIEW:

DEPARTMENT RESPONSIBLE FOR MSDS:

PRODUCT INFORMATION CONTACT:

I, VII, VIII, IX, XI

10/90 - Replaces MSDS dated 1/90

Safety, Occupational Health & Environmental Affairs

MSDS Administrator

Conoco Inc.

(713) 293-5550

CABOT Material Safety Data Sheet

(MSDS has been prepared in accordance with
ISO 11014-1/ ANSI standard Z400.1-1998, 93/112/EC.)

*Section 1 - Product and Company Identification

Trade Name: BLACK PEARLS[®], ELFT[®], MOGUL[®], MONARCH[®], REGAL[®], STERLING[®], VULCAN[®], CSX[®], CRX[®], IRX[®], carbon black grade series. The foregoing are registered trade names of the Cabot Corporation. *Excludes Oil Pelleted and FDA indirect food contact grades.

Product Code: Not Applicable	Product Type: Carbon Black	Date Revised: Sept, 1999 Previous: June, 1996
Manufacturer: Cabot Corporation 157 Concord Road Billerica, MA 01821	Tel #: (978) 670-6959 Emergency #: Chemtec: (USA) (800) 424-9300 or (703) 527-3887 Canutec: (Canada) (613) 996-6666	
Prepared by: Jeffrey Foy, Ph.D., Toxicologist		
Product Chemical Name: Carbon Black		
Chemical Family: Carbon Black		
Product Trivial Name: Furnace Black		
Chemical Formula: C Molecular Weight: 12		

*Section 2 - Composition / Information on Hazardous Ingredients

Substance Name	C.A.S. No.	EINECS No.	% by Weight
Carbon Black, Amorphous	1333-86-4	215-609-9	100%

This material is classified as hazardous under OSHA regulations.

*Section 3 - Hazards Identification

Emergency Overview - A black, odorless powder which can burn or smolder at temperatures greater than 572°F(>300°C). Hazardous products of decomposition can include carbon monoxide, carbon dioxide and oxides of sulfur. May cause mechanical irritation to the eyes and temporary discomfort to the respiratory tract at concentrations above the occupational exposure limit.

Potential Environmental Effects - No significant environmental hazards are associated with carbon black release to the environment. Carbon black is not soluble in water. See Section 12.

Potential Health Effects

Routes of Exposure: Skin, Eye, Inhalation.

Inhalation: Temporary discomfort to upper respiratory tract may occur due to mechanical irritation when exposures are well above the occupational exposure limit.

Ingestion: No evidence of adverse effects from available data.

Eyes: High dust concentrations may cause mechanical irritation to eye.

Skin: No adverse effects expected.

Sensitization: No cases of sensitization in humans have been reported.

Chronic: IARC listed; Group 2B substance (possibly carcinogenic to humans). See Section 11. There are no known human carcinogenic effects related to the polycyclic aromatic hydrocarbons (PAH) content of carbon blacks.

Medical Conditions Aggravated: None known

*Section 7 - Handling and Storage

Handling Precautions: Avoid dust exposures above the occupational exposure limit. Avoid contact with skin and eyes. Wash exposed skin daily. Use local exhaust ventilation to control exposures to below occupational exposure limit. Fine dust may cause electrical shorts and is capable of penetrating electrical equipment unless tightly sealed. If hot work (welding, torch cutting, etc.) is required the immediate work area must be cleared of carbon black product and dust.

Storage Precautions: Store in dry place away from ignition sources and strong oxidizers. Before entering closed vessels and confined spaces containing carbon black test for adequate oxygen, flammable gases and potential toxic air contaminants (i.e., CO). Follow safe practices when entering confined spaces.

*Section 8 - Exposure Controls / Personal Protection

Exposure guidelines:

Country	Occupational Exposure Limit, mg/m ³
Australia	3.0 TWA
United States	
OSHA-PEL	3.5 TWA
ACGIH-TLV	3.5 TWA
NIOSH-REL	3.5 TWA (see Section 11)
Germany	
MAKs	1.5 respirable TWA*
	4.0 inhalable TWA*
TRGS 900	6.0 respirable TWA*
Canada	3.5 TWA
United Kingdom	3.5 TWA
	7.0 STEL, 10 minutes
France	3.5 TWA
Sweden	3.0 TWA
Korea	3.5 TWA

*For particulates not otherwise classified (PNOC).

Respiratory Protection

An approved air-purifying respirator (APR) for particulates may be permissible where airborne concentrations are expected to exceed occupational exposure limits. Protection provided by air-purifying respirators is limited. Use a positive-pressure, air supplied respirator if there is any potential for uncontrolled release, exposure levels are not known, or any circumstances where air-purifying respirators may not provide adequate protection. Use of respirators must include a complete respiratory protection program in accordance with national standards and current best practices.

The following agencies/organizations approve respirators and/or criteria for respirator programs:

- U.S.: NIOSH approval under 42 CFR 84 required.
OSHA (29 CFR 1910.134)
ANSI Z88.2-1992 (Respiratory Protection)
- EU: CR592 Guidelines for the Selection and Use of Respiratory Protection.
- Germany: DIN/EN 143 Respiratory Protective Devices for Dusty Materials.
- UK: BS 4275 Recommendations for the Selection, Use and Maintenance of Respiratory Protective Equipment.
HSE Guidance Note HS(G)53 Respiratory Protective Equipment.

***Section 11- Toxicological Information**

Subchronic Toxicity:	Rat, inhalation, duration 90 days. Target organ: lungs; inflammation, hyperplasia, fibrosis. NOEL = 1.1 mg/m ³
Epidemiology:	Results of epidemiological studies of carbon black production workers have been inconsistent and difficult to interpret. Studies evaluating statistical associations of carbon black production work with symptoms of cough and sputum have been inconsistent. Based on a comprehensive independent review of a major epidemiological study, the validity of a relationship between carbon black exposure and symptoms of cough and sputum can not be supported by the available data. Changes in some lung function tests and increased average number of opacities (shadows) on chest x-ray examinations have also been suggested, but their clinical significance is uncertain.
Chronic Inhalation:	Rat, inhalation, duration: 2 years Target organ: Lungs Effect: inflammation, fibrosis, tumors Note: Tumors in the rat lung are related to the fine particle overload phenomenon rather than to a specific chemical effect of the dust particles in the lung. These effects in rats have been reported in studies on other inorganic insoluble particles and appear to be species specific. Tumors have not been observed in other species (i.e., mouse and hamster) for carbon black under similar circumstances and study conditions.
Chronic Ingestion:	Rat, oral (feeding experiments), duration: 2 years, no tumors Mouse, oral (feeding experiments), duration: 2 years, no tumors
Chronic Skin:	Mouse, dermal, duration: 12-18 months, no skin tumors
Mutagenicity:	Because carbon black is not soluble or dispersible in aqueous systems testing in bacterial and other in-vitro systems should be conducted using DMSO. A DMSO suspension of carbon black produced negative results in an Ames test. Organic solvent extracts of carbon black can however contain traces of polycyclic aromatic hydrocarbons (PAH). These can cause negative and positive test results in different in-vitro test systems. In an experimental investigation, mutational changes in the hprt gene were reported in alveolar epithelial cells in the rat following inhalation exposure to carbon black. This observation is believed to be rat specific and a consequence of "lung overload" (see Chronic toxicity above).
Reproductive Effects:	No effects have been reported in reproductive organs in long term animal studies.
Authoritative body classification:	In 1995 International Agency for Research on Cancer (IARC) concluded, "There is <i>inadequate evidence</i> in humans for the carcinogenicity of carbon black." Based on rat inhalation studies IARC concluded that there is, " <i>sufficient evidence</i> in experimental animals for the carcinogenicity of carbon black," IARC's overall evaluation in 1995 was that, "Carbon black is <i>possibly carcinogenic to humans (Group 2B)</i> ". This conclusion was based on IARC's guidelines which require such a classification if one species exhibits carcinogenicity in two or more studies. In its 1987 review IARC concluded, "There is <i>sufficient evidence</i> in experimental animals for the carcinogenicity of carbon black extracts." Carbon black extracts are classified as, <i>possibly carcinogenic to humans (Group 2B)</i> . Carbon black is not designated a carcinogen by the U.S. National Toxicology Program (NTP) or the U.S. Occupational Safety and Health Administration (OSHA). The American Conference of Governmental Industrial Hygienists classifies carbon black as A4, <i>Not Classifiable as a Human Carcinogen</i> . The U.S. National Institute of Occupational Safety and Health (NIOSH) 1978 criteria document on carbon black recommends that only carbon blacks with PAH levels greater than 0.1% require the measurement of PAHs in air. As some PAHs are possible human carcinogens, NIOSH recommends an exposure limit of 0.1 mg/m ³ for PAHs in air, measured as the cyclohexane-extractable fraction.

*Section 15 - Regulatory Information

National Registries - Carbon black, CAS number 1333-86-4, appears on the following inventories:

United States: TSCA (Toxic Substance Control Act inventory). Carbon Black is a Chemical Hazard Information Profile (CHIP) Chemical under TSCA.

Europe (EU): EINECS (European Inventory of Existing Commercial Chemical Substances), EINECS-RN: 215-609-9.

Canada: CEPA (Canadian Environmental Protection Act), Domestic Substance List (DSL).

Japan: MITI (Ministry of International Trade and Industry) List of Existing Chemical Substances. 10-3074/5-3328 and 10-3073/5-5222 (Section-Structure No./Class Reference No.)

Korea: TCC-ECL (Toxic Chemical Control Law Existing Chemical List): KE-04882

Australia: AICS (Australian Inventory of Chemical Substances)

Europe (EU): Carbon black is not defined as a dangerous substance regarding EU Directive 67/548/EEC and its various amendments and adaptations.

Canada: WHMIS, class D2A.

United States:

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, 40 CFR 302): Carbon black is not a hazardous substance under the CERCLA.

Clean Water Act (40 CFR 116): not listed

Clean Air Act Amendments of 1990 (CAA 40 CFR): Not listed. The product is not made with nor does it contain any Class 1 or Class 2 ozone depleting substances as defined under the 1990 amendments to the act.

CONEG Legislation - The products referenced in Section 1 meet the Coalition of Northeast Governors (CONEG) Source Reduction Council limits for the sum of the levels of Lead, Cadmium, Mercury and Hexavalent Chromium of less than 100 parts per million by weight.

U.S. State Regulations:

California: Carbon black is not a Proposition 65 listed chemical.

Louisiana: Right to know legislation requires inventory reporting through Community Right-to-Know when the quantity of Carbon black exceeds 500 pounds on any given day. Spills or releases beyond the site of the facility of greater than 5,000 pounds are required to be immediately reported to the state Emergency Response Commission via the Office of the State Police, Transportation and Environmental Safety Section, Hazardous Material Hotline, (504) 925-6596 (collect calls accepted 24 hours a day).

New Jersey: Carbon Black, C.A.S. 1333-86-4

U.S. SARA Title III - Superfund Amendments and Reauthorization Act (SARA)

Section 302: Does not contain any constituents that are identified as extremely hazardous.

Section 311/312: Carbon black is subject to EPA's "Hazardous Chemical Reporting and Community Right-to-Know". Tier I and/or Tier II forms need to be submitted if carbon black is present at the facility in quantities greater than 10,000 pounds at any one time.

Section 311/312 - MSDS Requirements - Our evaluation has found this material to be hazardous and should be reported under the following EPA hazard categories:

-- Immediate health hazard

XX Delayed (chronic) health hazard

-- Fire hazard

-- Sudden release of pressure hazard

-- Reactive hazard

Section 313: Does not contain any of the substances identified under Section 313 as toxic chemicals in Excess of the *de minimis* concentrations necessary to be subject to this rule.

Food Contact Regulations: Carbon black is permitted for indirect contact with food and drugs when used as a filler in rubber articles intended for repeat use under 21 CFR (Code of Federal Regulations) 177.2600.



Revision Date: 01/25/2001
Revision Number: 3
Date Printed: 03/27/2001

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: **Akrochem® SMR L Rubber-Comm.**
Stock No.: 67155
Chemical Name: Polyisoprene Rubber, Natural
Chemical Family: Natural Rubber
Formula: (C₅H₈)_x
Cas Number: 9003-31-0

SUPPLIED BY:
Akrochem Corporation
255 Fountain Street
Akron, Ohio 44304-1991

INFORMATION :
(330) 535-2100
EMERGENCY (After Hours):
(330) 535-2100 Ext. 1172

Prepared By: Andrew J. Sill

2. COMPOSITION / INFORMATION ON INGREDIENTS

<u>COMPONENT</u> <u>CAS REG NO.</u>	<u>APPROX.</u> <u>WGT. %</u>	<u>ACGIH</u> <u>LIMITS</u>	<u>OSHA</u> <u>LIMITS</u>
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NON-HAZARDOUS COMPONENTS

Components Not Listed are Trade Secrets In Accordance with OSHA 29 CFR 1910.1200

<u>Component / CAS</u>	<u>Percent</u>	<u>ACGIH Short Term Exposure Limit (STEL) value:</u>	<u>OSHA Short Term Exposure Limit (STEL) value:</u>
Natural Rubber 9003-31-0	100	NA	NA

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

No specific hazards.

SENSITIVITY TO STATIC DISCHARGE:

Sensitivity to static discharge is not expected.

EXTINGUISHING MEDIA:

CO₂, Foam

ADDITIONAL FIREFIGHTING PROCEDURES:

Fire-fighters should wear self-contained breathing apparatus and full protective clothing when fighting chemical fires.

6. ACCIDENTAL RELEASE MEASURES

ACTION TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

Sweep or gather up material and place in proper container for disposal or recovery.

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:

Store in a cool, dry location.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS:

Showers. Eyewash stations.

RESPIRATORY PROTECTION EQUIPMENT:

Local exhaust is desirable.

PROTECTIVE GLOVES:

Chemical resistant

EYE AND FACE PROTECTION:

Chemical safety glasses with side shields or chemical safety goggles.

OTHER PROTECTIVE EQUIPMENT:

None required.

VENTILATION:

Local exhaust is desirable

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point:

Not Applicable

Vapor Pressure:

Not Applicable

VAPOR DENSITY (AIR=1):

Not Applicable

Flash Point

Not Established

MELTING POINT/FREEZE POINT:

Not Established

PHYSICAL STATE:

SOLID

ODOR:

CHARACTERISTIC

COLOR:

AMBER

RELATIVE VAPOR PRESSURE THRESHOLD (PPM):

Not Established

14. TRANSPORT INFORMATION

Shipping Name: NOT REGULATED

HAZARD CLASS: N/A

DOT LABEL(S): NONE

UN/NA NUMBER: N/A

IATA: N/A

IMO IMDG-code: N/A

15. REGULATORY INFORMATION

TSCA STATUS: All components of this product are listed on the TSCA Inventory.

SARA SECTION 302: Not Reportable

SARA (311, 312) HAZARD CLASS: ACUTE HEALTH HAZARD.

SARA (313) CHEMICALS:

~~Contains~~ NO SARA Title III, Section 313 notification chemical present at or above the ~~concentration~~ concentration.

NEW JERSEY RIGHT TO KNOW:

Natural Rubber - Cas #9003-31-0 - (Not Listed)

CA PROP 65:

To the best of our knowledge, this product contains no levels of listed substances, which in the state of California have been found to cause cancer, birth defects or other reproductive effects.

PENNSYLVANIA RIGHT TO KNOW:

N Listed

HMIS:

HEALTH 0 , FLAMMABILITY 1 , REACTIVITY 0

NFPA:

Not Determined

16. OTHER INFORMATION

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*** END OF MSDS ***

MATERIAL SAFETY DATA SHEET

AKROCHEM CORPORATION 255 FOUNTAIN STREET AKRON, OHIO 44304
EMERGENCY TELEPHONE: 330-535-2108

TRADENAME: NATURAL RUBBER (ALL GRADES) (66295,66950,66951,67000
(L,XL,CV-60,WF,SIR-10) 67050,67100,67105,67150)

CHEMICAL NAME: Polyisoprene Rubber, Natural

CHEMICAL FAMILY: Natural Rubber CAS # 9003-31-0

PREPARED BY: R.S. Brust DATE: 08/17/94

***** SECTION II - HAZARDOUS COMPONENTS *****
OSHA Pel ACGIH TLV OTHER

None

Contains no SARA Title III, Section 313 notification
chemical present at or above the deminimus concentration.

[Ingredients not precisely identified are nonhazardous.
All ingredients appear on the EPA TSCA Inventory.]

***** SECTION III - PHYSICAL/CHEMICAL PROPERTIES *****

Boiling Point: N/A Specific Gravity: 0.93

Vapor Pressure (mm Hg): N/A Melt Point: N/A

Vapor Density (Air=1): N/A Evaporation Rate: N/A

Solubility in Water: Insoluble

Appearance and Odor: Amber, dry blocks or sheets; characteristic odor.

***** SECTION IV - FIRE AND EXPLOSION DATA *****

Flash Point: N/A Flammable Limits: LEL: N/A UEL: N/A

Extinguishing Media: Foam, CO₂

Special Fire Fighting Procedures:
Wear self-contained breathing apparatus.

Unusual Fire and Explosion Hazards: None known

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its entirety.

PRODUCT IDENTITY: SC-15 BLEND

PAGE 1 OF 4

MATERIAL SAFETY DATA SHEET

THIS MSDS COMPLIES WITH 29 CFR 1910.1200 (HAZARD COMMUNICATION STANDARD)

IMPORTANT: Read this MSDS before handling & disposing of this product.

Pass this information on to employees, customers, & users of this product.

SECTION 1. CHEMICAL PRODUCT & COMPANY IDENTIFICATION / HAZARD RATINGS

PRODUCT IDENTITY: SC-15 BLEND

COMPANY IDENTITY: CSD/STARTEX

COMPANY ADDRESS: P O BOX 3087

COMPANY CITY: CONROE, TX 77305

COMPANY PHONE: 1-936-756-1065

CHEMTREC PHONE: 1-800-424-9300

HAZARD RATINGS:

HEALTH (NFPA): 2

HEALTH (HMIS): 2

FLAMMABILITY: 3

REACTIVITY: 0

SECTION 2. INGREDIENT & REGULATORY INFORMATION

All components of this product are on the TSCA list.

SARA Title III Section 313 Supplier Notification

This product contains the indicated <*> toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning & Community Right-To-Know Act of 1986 & of 40 CFR 372. This information must be included in all MSDSs that are copied and distributed for this material.

SARA TITLE III INGREDIENTS

INGREDIENT	CAS#	WT. % (REG. SECTION)	RQ(LBS)
*Methyl Isobutyl Ketone	108-10-1	48 (311, 312, 313, RCRA)	5000
*Mixed Xylenes	1330-20-7	41 (311, 312, 313, RCRA)	100
Ethylbenzene	100-41-4	10 (311, 312, 313, RCRA)	1000

HAZARD SECTION 311/312 HAZARDS: Acute Health, Fire

MATERIAL

MATERIAL	CAS #	TWA (OSHA)	TLV (ACGIH)	HAP
Methyl Isobutyl Ketone	108-10-1	100 ppm	50 ppm	Yes
Mixed Xylenes	1330-20-7	100 ppm	100 ppm	Yes
Ethylbenzene	100-41-4	100 ppm	100 ppm	Yes

In addition to EPA Hazardous Air Pollutants showing 'Yes' under "HAP" above, using manufacturers' data, based on EPA Method 311, the following EPA Hazardous Air Pollutants may be present in trace amounts (less than 0.1%):

Benzene, Toluene, Cumene

MATERIAL

MATERIAL	CAS #	CEILING	STEL (OSHA/ACGIH)
Methyl Isobutyl Ketone	108-10-1	None Known	75 ppm
Mixed Xylenes	1330-20-7	None Known	150 ppm
Ethylbenzene	100-41-4	None Known	125 ppm

CALIFORNIA PROPOSITION 65: This product contains the following chemical known to the State of California to cause cancer:

a trace of Benzene

IF > 241 POUNDS OF THIS PRODUCT IS IN ONE CONTAINER THE "RQ" IS EXCEEDED.

DOT SHIPPING NAME: RQ, Paint Related Material

(Contains: Mixed Xylenes), 3, UN1263, PG-II

DRUM LABEL: (FLAMMABLE LIQUID)

SECTION 3. HAZARDS IDENTIFICATION

MATERIAL

MATERIAL	CAS #	LOWEST KNOWN LETHAL DOSE DATA
Methyl Isobutyl Ketone	108-10-1	2080.0 mg/kg (Rats)
Ethyl Isobutyl Ketone	108-10-1	4000 ppm (Rats)

THRESHOLD LIMIT VALUE: 60 ppm (Freshly Prepared)
CONTAINS: METHYL ISOBUTYL KETONE, MIXED XYLENES, ETHYLBENZENE
WARNING!
FLAMMABLE!!

ACUTE HAZARDS

EYE & SKIN CONTACT:

Primary irritation to skin, defatting, dermatitis.
Absorption thru skin increases exposure.
Primary irritation to eyes, redness, tearing, blurred vision.
Liquid can cause eye irritation. Wash thoroughly after handling.

INHALATION:

Anesthetic. Irritates respiratory tract. Acute overexposure
can cause serious nervous system depression. Vapor harmful.
Acute overexposure can cause damage to kidneys, blood, nerves, liver & lungs.

SWALLOWING:

Harmful or fatal if swallowed.
Swallowing can cause abdominal irritation, nausea, vomiting & diarrhea.

SUBCHRONIC HAZARDS/CONDITIONS AGGRAVATED

CONDITIONS AGGRAVATED

Chronic overexposure can cause damage to kidneys, blood, nerves, liver & lungs.
Persons with severe skin, liver or kidney problems should avoid use.

CHRONIC HAZARDS

CANCER, REPRODUCTIVE & OTHER CHRONIC HAZARDS:

been reported in .

Due to metabolic differences, the results are not relevant in humans.

This product may contain less than 51 ppm of Benzene.

not considered hazardous in such low concentrations.

Absorption thru skin may be harmful. Studies with laboratory animals
indicate this product can cause damage to fetus.

SECTION 4. FIRST AID MEASURES PROCEDURES

EYE CONTACT:

For eyes, flush with plenty of water for 15 minutes & get medical attention.

SKIN CONTACT:

In case of contact with skin immediately remove contaminated clothing.
Wash thoroughly with soap & water. Wash contaminated clothing before reuse.
(Discard contaminated shoes.)

INHALATION:

After high vapor exposure, remove to fresh air. If breathing is difficult,
give oxygen. If breathing has stopped give artificial respiration. CALL A
PHYSICIAN immediately!

SWALLOWING:

If swallowed, CALL A PHYSICIAN IMMEDIATELY! Do NOT induce vomiting.
Have patient lie down & keep warm.. Vomiting may lead to pneumonitis, which
may be fatal.

SECTION 5. FIRE FIGHTING MEASURES

AUTO IGNITION TEMPERATURE : 426 C / 800 F (Lowest Component)

LOWER FLAMMABLE LIMIT IN AIR (% by vol): 1.2

FLASH POINT (TEST METHOD): 17 C / 64 F (TCC) (Lowest Component)

FLAMMABILITY CLASSIFICATION: Class I B

EXTINGUISHING MEDIA

Use Class B extinguishers (Carbon Dioxide or foam) for Class I B liquid fires.

ADDITIONAL FIRE FIGHTING PROCEDURES

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).
Use NIOSH approved positive-pressure self-contained breathing apparatus.
UNUSUAL EXPLOSION AND FIRE PROCEDURES

FLAMMABLE!!

Keep container tightly closed.
Isolate from oxidizers, heat, sparks, electric equipment & open flame.
Closed containers may explode if exposed to extreme heat.
Applying to hot surfaces requires special precautions.
Empty container very hazardous! Continue all label precautions!

SECTION 6. ACCIDENTAL RELEASE MEASURES

SPILL OR LEAK PROCEDURES

Stop spill at source. Dike area & contain. Clean up remainder with absorbent materials. Mop up & dispose of. Persons without proper protection should be kept from area until cleaned up.

WASTE DISPOSAL METHOD

Recycle or dispose of observing local, state & Federal health, safety & pollution laws. If questions exist, contact the appropriate agencies.

SECTION 7. HANDLING AND STORAGE

HANDLING

Isolate from oxidizers, heat, sparks, electric equipment & open flame.
Use only with adequate ventilation. Avoid breathing of vapor or spray mist.
Avoid contact with skin & eyes.
Wear OSHA Standard goggles or face shield. Consult Safety Equipment Supplier.
Wear gloves, apron & footwear impervious to this material. Wash clothing before reuse.
Avoid free fall of liquid. Ground containers when transferring. Do not flame cut, saw, drill, braze, or weld. Empty container very hazardous! Continue all label precautions!

STORAGE

Do not store above 49 C/120 F. Store large amounts in structures made for OSHA Class I B liquids. Keep container tightly closed & upright when not in use to prevent leakage.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION:

EXPOSURE CONTROLS

Ventilate to keep vapors of this material below 30 ppm. If over TLV, in accordance with 29 CFR 1910.134, use NIOSH approved positive-pressure self-contained breathing apparatus. Consult Safety Equipment Supplier. Use explosion-proof equipment.

VENTILATION

LOCAL EXHAUST	: Necessary
MECHANICAL (GENERAL)	: Acceptable
SPECIAL	: None
OTHER	: None

PERSONAL PROTECTIONS:

Wear OSHA Standard goggles or face shield. Consult Safety Equipment Supplier.
Wear gloves, apron & footwear impervious to this material. Wash clothing before reuse.

SECTION 9. PHYSICAL DATA

APPEARANCE :	Liquid, Water-White		
OR :	Ketone		
BILLING RANGE :	116 129 141 C / 242 265 286 F		
DENSITY @ 60 F :			
API :	37.2		
SPECIFIC GRAVITY (Water=1) :	.839		
POUNDS/GALLON :	6.989		
VOC'S (>0.44 Lbs/Sq In) :	100.1 Vol. % /	840.0 g/L /	6.997 Lbs/Gal
TOTAL VOC'S (TVOC) :	100.0 Vol. % /	839.0 g/L /	6.988 Lbs/Gal
NONEXEMPT VOC'S (CVOC) :	100.0 Vol. % /	839.0 g/L /	6.988 Lbs/Gal
HAZARDOUS AIR POLLUTANTS (HAPS) :	100.0 Wt. % /	839.0 g/L /	6.988 Lbs/Gal
VAPOR PRESSURE (mm of Hg)@20 C	10.7		
NONEXEMPT VOC PARTIAL PRESSURE (mm of Hg @ 20 C)	10.7		
VAPOR DENSITY (air=1) :	3.6		
WATER ABSORPTION :	Negligible		
SOLVENCY PARAMETERS:			
HKB (Hydrogen Bonding) :	22.4		
PKB (Polarity) :	42.6		
DKB (Dispersion) :	35.0		
REFRACTIVE INDEX :	1.446		
MIXED ANILINE POINT (Acid Insol):	10 C / 50 F		

SECTION 10. REACTIVITY DATA

STABILITY

Stable

CONDITIONS TO AVOID

Isolate from oxidizers, heat, sparks, electric equipment & open flame.

MATERIALS TO AVOID

Isolate from strong oxidizers such as permanganates, chromates & peroxides.

HAZARDOUS DECOMPOSITION PRODUCTS

Carbon Monoxide, Carbon Dioxide from burning.

HAZARDOUS POLYMERIZATION

Will not occur.

NOTICE

The supplier disclaims all expressed or implied warranties of merchantability or fitness for a specific use, with respect to the product or the information provided herein, except for conformation to contracted specifications.

All information appearing herein is based upon data obtained from manufacturers and/or recognized technical sources. While the information is believed to be accurate, we make no representations as to its accuracy or sufficiency.

Conditions of use are beyond our control, and therefore users are responsible for verifying the data under their own operating conditions to determine whether the product is suitable for their particular purposes and they assume all risks of their use, handling, and disposal of the product. Users also assume all risks in regards to the publication or use of, or reliance upon, information contained herein.

This information relates only to the product designated herein, and does not relate to its use in combination with any other material or process.

MATERIAL SAFETY DATA SHEET

IDENTIFICATION

NAME

Staurolite Products

CHEMICAL FAMILYMixture of mineral sands,
primarily ferrous aluminum silicate**GRADE**Coarse Staurolite; BIASILL*;
STARBLAST*; STARBLAST* XL**TSCA INVENTORY STATUS**

Reported/Included

SYNONYMS

Staurolite Sands

PRODUCT INFORMATION PHONE

(800) 441-9442

SARA/TITLE III STATUS

See ADDITIONAL INFORMATION section

TRANSPORTATION EMERGENCY PHONE

CHEMTREC (800) 424-9300

MANUFACTURER/DISTRIBUTOR

Du Pont Company

MEDICAL EMERGENCY PHONE

(800) 441-3637

ADDRESS

Wilmington, DE 19898

PHYSICAL DATA

BOILING POINT, 760 mmHg

Not applicable

MELTING POINT

1370°C (2500°F)

SPECIFIC GRAVITY

3.7

VAPOR PRESSURE

Not volatile.

VAPOR DENSITY

Not volatile.

SOLUBILITY IN WATER

Insoluble

pH INFORMATION

Not applicable.

EVAPORATION RATE (Butyl Acetate = 1)

Not volatile.

FORM

Solid

APPEARANCE

Free-flowing sand

COLOR

Reddish brown

ODOR

Odorless

*Reg. U. S. Pat. & Tm. Office, Du Pont Company. STARBLAST^R and BIASILL^R Sands are sold only by Du Pont.

H-06066-2 Date: 7/90

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

FIRE AND EXPLOSION DATA HAZARDS

FLASH POINT

Will not burn.

FIRE AND EXPLOSION HAZARDS

None

EXTINGUISHING MEDIA

As appropriate for combustibles in area.

SPECIAL FIRE FIGHTING INSTRUCTIONS

None

HEALTH HAZARD INFORMATION

PRINCIPAL HEALTH HAZARDS (Including Significant Routes, Effects, Symptoms of Overexposure, and Medical Conditions Aggravated by Exposure)

The product, as shipped, does not pose any inhalation health hazard because it contains essentially no particles in the respirable size range. However, if during handling or use, the particles are broken down to a size that can be inhaled, the dusts may be harmful to the respiratory system. Eye contact with mineral sands may cause irritation with discomfort, tearing, or blurring of vision.

Staurolite Sands may contain up to 5% quartz. Effects noted in animals exposed to respirable quartz by inhalation or intratracheal instillation included pulmonary fibrosis, inflammation, edema, and emphysema. Lung tumors occurred in rats exposed by inhalation for up to two years to levels of 12.4 or 51.6 mg/m³ of respirable quartz. Also, lung tumors were seen in studies in which quartz was instilled in the trachea of rats. Quartz was positive in mammalian cell cultures for cell transformation and chromosomal effects and was negative in cell culture assays for gene mutation in bacteria and DNA damage in mammalian cells and in a whole animal assay for chromosomal effects.

The predominant effect of overexposure to airborne respirable quartz in humans is silicosis. Silicosis is a chronic fibrotic lung disease characterized by formation of silica-containing scar tissue in the lungs with symptoms of coughing, dyspnea, wheezing and nonspecific respiratory ailments. Gross acute overexposures to quartz by inhalation may cause fatality. Epidemiological studies show that in addition to silicosis, there is limited evidence of excess lung cancer in occupations involving exposures mainly to respirable quartz, such as stone cutters and granite industry workers. Individuals with preexisting conditions of the lungs may have increased susceptibility to the toxicity of excessive exposures.

Trace levels of naturally occurring radionuclides, similar to background levels, are present in the Staurolite products.

HEALTH HAZARD INFORMATION (cont'd)

CARCINOGENICITY

Quartz (crystalline silica) is listed by the International Agency for Research on Cancer as probably carcinogenic to humans on the basis of at least limited human data (IARC, group 2A) and the National Toxicology Program (proposed). Warning: These products contain substances (crystalline quartz and radionuclides) known to the State of California to cause cancer.

Other ingredients are not listed as carcinogens by IARC, NTP, OSHA or ACGIH.

EXPOSURE LIMITS

For zirconium compounds (as Zr), the OSHA 8-hour TWA and ACGIH TLV-TWA is 5 mg/m³; the OSHA and ACGIH STEL is 10 mg/m³.

For quartz (crystalline silica), the OSHA 8-hour TWA, the ACGIH TLV-TWA, and the Du Pont 8-hour AEL is 0.1 mg/m³ (respirable dust).

Exposure limits for staurolite dusts have not been established by OSHA or ACGIH. However, for particulates (not otherwise regulated), OSHA has established an 8-hour Time Weighted Average (TWA) of 5 mg/m³ (respirable dust), 15 mg/m³ (total dust).

SAFETY PRECAUTIONS

Avoid breathing respirable dust.
Wash thoroughly after handling.

FIRST AID

In case of eye contact: Immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

In case of skin contact: The compound is not hazardous by skin contact but cleansing the skin after use is advisable.

If inhaled: Remove to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

If swallowed: No specific intervention is indicated as the compound is not hazardous by ingestion. However, if symptoms occur, consult a physician.

PROTECTION INFORMATION

GENERALLY APPLICABLE CONTROL MEASURES

Sufficient ventilation should be provided to keep respirable dust concentrations below the indicated exposure limits.

PERSONAL PROTECTIVE EQUIPMENT

Safety spectacles (side shields preferred) should be worn when handling these products. NIOSH/MSHA approved air supplied abrasive blasting respirators should be worn by all exposed abrasive-blasting operators. NIOSH/MSHA approved filter respirators equipped with high-efficiency filters may be worn for short, intermittent, or occasional exposures involving cleanup or dumping of Staurolite product bags.



Revision Date: 01/25/2001
Revision Number: 2
Date Printed: 03/27/2001

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: **SMR CV60 Rubber**
Stock No.: 67110
Chemical Name: Polyisoprene Rubber, Natural
Chemical Family: Natural Rubber
Formula: (C₅H₈)_x
Cas Number: 9003-31-0

SUPPLIED BY:
Akrochem Corporation
255 Fountain Street
Akron, Ohio 44304-1991

INFORMATION :
(330) 535-2100
EMERGENCY (After Hours):
(330) 535-2100 Ext. 1172

Prepared By: Andrew J. Sill

2. COMPOSITION / INFORMATION ON INGREDIENTS

<u>COMPONENT</u> <u>CAS REG NO.</u>	<u>APPROX.</u> <u>WGT. %</u>	<u>ACGIH</u> <u>LIMITS</u>	<u>OSHA</u> <u>LIMITS</u>
--	---------------------------------	-------------------------------	------------------------------

NON-HAZARDOUS COMPONENTS

Components Not Listed are Trade Secrets In Accordance with OSHA 29 CFR 1910.1200

Component / CAS	Percent	ACGIH Short Term Exposure Limit (STEL) value:	OSHA Short Term Exposure Limit (STEL) value:
Natural Rubber 9003-31-0	Trade Sec	NA	NA

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:
No specific hazards.

SENSITIVITY TO STATIC DISCHARGE:

Sensitivity to static discharge is not expected.

EXTINGUISHING MEDIA:

Foam

SPECIAL FIREFIGHTING PROCEDURES:

Fire-fighters should wear self-contained breathing apparatus and full protective clothing when fighting chemical fires.

6. ACCIDENTAL RELEASE MEASURES

ACTION TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

Sweep or gather up material and place in proper container for disposal or recovery.

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:

Store in a cool, dry location.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS:

Showers. Eyewash stations.

RESPIRATORY PROTECTION EQUIPMENT:

Local exhaust is desirable.

PROTECTIVE GLOVES:

Optional

EYE AND FACE PROTECTION:

Chemical safety glasses with side shields or chemical safety goggles.

OTHER PROTECTIVE EQUIPMENT:

None required.

VENTILATION:

Local exhaust is desirable

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point:

Not Applicable

Vapor Pressure:

Not Applicable

VAPOR DENSITY (AIR=1):

Not Applicable

Flash Point

Not Established

MELTING POINT/FREEZE POINT:

Not Established

PHYSICAL STATE:

SOLID

ODOR:

CHARACTERISTIC

Color:

AMBER

LEAKAGE THRESHOLD (PPM):

Not Established

Akrochem Corporation

SMR CV60 Rubber

Page 3 Of 5

14. TRANSPORT INFORMATION

Shipping Name: NOT REGULATED
HAZARD CLASS: N/A
DOT LABEL(S): NONE
UN/NA NUMBER: N/A
IATA: N/A
IMO IMDG-code: N/A

15. REGULATORY INFORMATION

TSCA STATUS: All components of this product are listed on the TSCA Inventory.
SARA SECTION 302: Not Reportable
SARA (311, 312) HAZARD CLASS: ACUTE HEALTH HAZARD.
SARA (313) CHEMICALS:
Contains no SARA Title III, Section 313 notification chemical present at or above the de minimus concentration.
NEW JERSEY RIGHT TO KNOW:
Natural Rubber - Cas #9003-31-0 - (Not Listed)

CA PROP 65:

To the best of our knowledge, this product contains no levels of listed substances, which in the state of California have been found to cause cancer, birth defects or other reproductive effects.

PENNSYLVANIA RIGHT TO KNOW:

Listed

HMIS:

HEALTH 0 , FLAMMABILITY 1 , REACTIVITY 0

NFPA:

Not Determined

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*** END OF MSDS ***



MATERIAL SAFETY DATA SHEET

MSDS NUMBER ▶

7,550-13

PAGE 1

SHELL: 713-473-9481 CHEMTREC: 800-424-9300		SHELL: 713-241-4819		BE SAFE READ OUR PRODUCT SAFETY INFORMATION ... AND PASS IT ON <small>(PRODUCT LIABILITY LAW NUMBER 1)</small>
ACUTE HEALTH + 2	FIRE 2	REACTIVITY 0	HAZARD RATING ▶ LEAST - 0 SLIGHT - 1 MODERATE - 2 HIGH - 3 EXTREME - 4	
*For acute and chronic health effects refer to the discussion in Section III				

PRODUCT ▶	SHELL MINERAL SPIRITS 135
CHEMICAL NAME ▶	MIXTURE
CHEMICAL FAMILY ▶	HYDROCARBON SOLVENT
SHELL CODE ▶	83048

SECTION II-A

PRODUCT/INGREDIENT

NO.	COMPOSITION	CAS NUMBER	PERCENT
P	SHELL MINERAL SPIRITS 135*	MIXTURE	100
1	SOLVENT NAPHTHA (PETROLEUM), MEDIUM ALIPHATIC	64742-88-7	85
2	SOLVENT NAPHTHA (PETROLEUM), LIGHT AROMATIC	64742-95-6	15
A	CONTAINS TRIMETHYLBENZENE	25551-13-7	8-10

*A COMPLEX COMBINATION OF PREDOMINATELY C8-C12 HYDROCARBONS; EXACT COMPOSITION WILL VARY.

SECTION II-B

ACUTE TOXICITY DATA

NO.	ACUTE ORAL LD50	ACUTE DERMAL LD50	ACUTE INHALATION LC50
P	NOT AVAILABLE		
1*	>25 ML/KG (RAT)	>4 ML/KG (RABBIT)	>700 PPM/4H (RAT)
2*	4.7 G/KG (RAT)	>4 ML/KG (RAT)	>3670 PPM/8H (RAT)

*BASED UPON TESTING OF EITHER PRODUCT OR ESSENTIALLY SIMILAR PRODUCTS.

SECTION III

HEALTH INFORMATION

THE HEALTH EFFECTS NOTED BELOW ARE CONSISTENT WITH REQUIREMENTS UNDER THE OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200).

EYE CONTACT

LIQUID IS MINIMALLY IRRITATING TO THE EYES. HIGH VAPOR CONCENTRATIONS MAY CAUSE IRRITATION.

SKIN CONTACT

LIQUID IS SLIGHTLY IRRITATING TO THE SKIN. PROLONGED OR REPEATED LIQUID CONTACT CAN RESULT IN DEFATTING AND DRYING OF THE SKIN WHICH MAY RESULT IN SKIN IRRITATION AND DERMATITIS.

INHALATION

VAPORS MAY BE IRRITATING TO NOSE, THROAT AND RESPIRATORY TRACT. HIGH VAPOR CONCENTRATIONS MAY CAUSE CNS DEPRESSION.

PRODUCT NAME: SHELL MINERAL SPIRITS 138

MSDS 7,850-13
PAGE 2**INGESTION**

INGESTION OF PRODUCT MAY RESULT IN VOMITING; ASPIRATION (BREATHING) OF VOMITUS INTO THE LUNGS MUST BE AVOIDED AS EVEN SMALL QUANTITIES MAY RESULT IN ASPIRATION PNEUMONITIS.

SIGNS AND SYMPTOMS

IRRITATION AS NOTED ABOVE. EARLY TO MODERATE CNS (CENTRAL NERVOUS SYSTEM) DEPRESSION MAY BE EVIDENCED BY GIDDINESS, HEADACHE, DIZZINESS AND NAUSEA; IN EXTREME CASES, UNCONCIOUSNESS AND DEATH MAY OCCUR. ASPIRATION PNEUMONITIS MAY BE EVIDENCED BY COUGHING, LABORED BREATHING AND CYANOSIS (BLuish SKIN); IN SEVERE CASES DEATH MAY OCCUR.

AGGRAVATED MEDICAL CONDITIONS

PREEXISTING EYE, SKIN AND RESPIRATORY DISORDERS MAY BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT.

SEE SECTION 4 FOR SUPPLEMENTAL INFORMATION.

SECTION IV**OCCUPATIONAL EXPOSURE LIMITS**

NO.	PEL/TWA	OSHA	PEL/CEILING	TLV/TWA	ACGIH	TLV/STEL	OTHER
P	NOT ESTABLISHED						
1*	100 PPM			100 PPM			
A	25 PPM			25 PPM			

*RECOMMEND THAT LIMITS FOR STODDARD SOLVENT BE USED AS A GUIDE.

SECTION V**EMERGENCY AND FIRST AID PROCEDURES****EYE CONTACT**

FLUSH EYES WITH PLENTY OF WATER FOR 15 MINUTES WHILE HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION.

SKIN CONTACT

REMOVE CONTAMINATED CLOTHING/SHOES. FLUSH SKIN WITH WATER. FOLLOW BY WASHING WITH SOAP AND WATER. IF IRRITATION OCCURS, GET MEDICAL ATTENTION. DO NOT REUSE CLOTHING UNTIL CLEANED.

INHALATION

REMOVE VICTIM TO FRESH AIR AND PROVIDE OXYGEN IF BREATHING IS DIFFICULT. GIVE ARTIFICIAL RESPIRATION IF NOT BREATHING. GET MEDICAL ATTENTION.

INGESTION

DO NOT INDUCE VOMITING. IF VOMITING OCCURS SPONTANEOUSLY, KEEP HEAD BELOW HIPS TO PREVENT ASPIRATION OF LIQUID INTO THE LUNGS. GET MEDICAL ATTENTION.*

NOTE TO PHYSICIAN

*IF MORE THAN 2.0 ML PER KG HAS BEEN INGESTED AND VOMITING HAS NOT OCCURRED, EMESIS SHOULD BE INDUCED WITH SUPERVISION. KEEP VICTIM'S HEAD BELOW HIPS TO PREVENT ASPIRATION. IF SYMPTOMS SUCH AS LOSS OF GAG REFLEX, CONVULSIONS OR UNCONSCIOUSNESS OCCUR BEFORE EMESIS, GASTRIC LAVAGE USING A CUFFED ENDOTRACHEAL TUBE SHOULD BE CONSIDERED.

SECTION VI**SUPPLEMENTAL HEALTH INFORMATION**

MALE RATS EXPOSED FOR 90 DAYS BY INHALATION TO VAPORS OF SOLVENTS SIMILAR TO COMPONENT 1 SHOWED EVIDENCE OF KIDNEY DAMAGE. THE RELEVANCE OF THIS EFFECT TO MAN IS UNKNOWN. IN ONE OF THE STUDIES A LOW GRADE ANEMIA WAS ALSO OBSERVED.

RATS EXPOSED FOR 4 MONTHS TO 1700 PPM OF A SOLVENT SIMILAR TO COMPONENT 2 SHOWED EVIDENCE OF MILD DAMAGE TO LIVER, LUNGS AND KIDNEYS. THESE EFFECTS WERE NOT SEEN IN RATS EXPOSED FOR ONE YEAR TO 350 PPM OF ANOTHER SIMILAR SOLVENT. RATS EXPOSED TO VAPORS OF A SIMILAR SOLVENT DURING PREGNANCY SHOWED EMBRYO/FETOTOXICITY AT CONCENTRATIONS PRODUCING MATERNAL TOXICITY.

IN RESPONSE TO A TSCA TEST RULE, SEVERAL STUDIES OF A COMPOUND SIMILAR TO COMPONENT 2 HAVE BEEN COMPLETED. MUTAGENICITY STUDIES AND A RAT INHALATION NEUROTOXICITY STUDY WERE NEGATIVE. IN A MOUSE DEVELOPMENTAL EFFECTS STUDY, REDUCED FETAL BODY WEIGHT WAS SEEN BUT NO TERATOGENICITY. A RAT REPRODUCTIVE EFFECTS STUDY DEMONSTRATED TOXICITY BUT LITTLE EFFECT ON REPRODUCTIVE PARAMETERS.

PRODUCT NAME: SHELL MINERAL SPIRITS 135

MSDS 7,650-13
PAGE 3

SECTION VII

PHYSICAL DATA

BOILING POINT: 320-357 (DEG F)	SPECIFIC GRAVITY: 0.781 (H2O=1)	VAPOR PRESSURE: 4.6@100 DEG. F (MM HG)
MELTING POINT: NOT AVAILABLE (DEG F)	SOLUBILITY: NEGLIGIBLE (IN WATER)	VAPOR DENSITY: 4.8* (AIR=1)
EVAPORATION RATE (N-BUTYL ACETATE = 1): 0.47		*ESTIMATED

APPEARANCE AND ODOR:
CLEAR LIQUID. HYDROCARBON ODOR.

SECTION VIII

FIRE AND EXPLOSION HAZARDS

FLASH POINT AND METHOD:
103 DEG. F (TCC)

FLAMMABLE LIMITS /% VOLUME IN AIR
LOWER: 0.7 UPPER: 6

EXTINGUISHING MEDIA

USE WATER FOG, FOAM, DRY CHEMICAL OR CO2. DO NOT USE A DIRECT STREAM OF WATER. PRODUCT WILL FLOAT AND CAN BE REIGNITED ON SURFACE OF WATER.

SPECIAL FIRE FIGHTING PROCEDURES AND PRECAUTIONS

CAUTION. COMBUSTIBLE. DO NOT ENTER CONFINED FIRE SPACE WITHOUT FULL BUNKER GEAR (HELMET WITH FACE SHIELD, BUNKER COATS, GLOVES AND RUBBER BOOTS), INCLUDING A POSITIVE PRESSURE NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER.

UNUSUAL FIRE AND EXPLOSION HAZARDS

CONTAINERS EXPOSED TO INTENSE HEAT FROM FIRES SHOULD BE COOLED WITH WATER TO PREVENT VAPOR PRESSURE BUILDUP WHICH COULD RESULT IN CONTAINER RUPTURE. CONTAINER AREAS EXPOSED TO DIRECT FLAME CONTACT SHOULD BE COOLED WITH LARGE QUANTITIES OF WATER AS NEEDED TO PREVENT WEAKENING OF CONTAINER STRUCTURE.

SECTION IX

REACTIVITY

STABILITY: STABLE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS AND MATERIALS TO AVOID:

AVOID HEAT, FLAME AND CONTACT WITH STRONG OXIDIZING AGENTS.

HAZARDOUS DECOMPOSITION PRODUCTS

CARBON MONOXIDE AND UNIDENTIFIED ORGANIC COMPOUNDS MAY BE FORMED DURING COMBUSTION.

SECTION X

EMPLOYEE PROTECTION

RESPIRATORY PROTECTION

AVOID PROLONGED OR REPEATED BREATHING OF VAPORS. IF EXPOSURE MAY OR DOES EXCEED OCCUPATIONAL EXPOSURE LIMITS (SEC. IV) USE A NIOSH-APPROVED RESPIRATOR TO PREVENT OVEREXPOSURE. IN ACCORD WITH 29 CFR 1910.134 USE EITHER AN ATMOSPHERE-SUPPLYING RESPIRATOR OR AN AIR-PURIFYING RESPIRATOR FOR ORGANIC VAPORS.

PRODUCT NAME: SHELL MINERAL SPIRITS 175

MSDS 7,550-13
PAGE 4**PROTECTIVE CLOTHING**

AVOID CONTACT WITH EYES. WEAR SAFETY GLASSES OR GOGGLES AS APPROPRIATE. AVOID PROLONGED OR REPEATED CONTACT WITH SKIN. WEAR CHEMICAL-RESISTANT GLOVES AND OTHER CLOTHING AS REQUIRED TO MINIMIZE CONTACT.

ADDITIONAL PROTECTIVE MEASURES

USE EXPLOSION-PROOF VENTILATION AS REQUIRED TO CONTROL VAPOR CONCENTRATIONS. AIR-DRY CONTAMINATED CLOTHING IN A WELL VENTILATED AREA, THEN LAUNDER BEFORE REUSING.

SECTION XI**ENVIRONMENTAL PROTECTION**
-----**SPILL OR LEAK PROCEDURES**

CAUTION. COMBUSTIBLE. *** LARGE SPILLS *** ELIMINATE POTENTIAL SOURCES OF IGNITION. WEAR APPROPRIATE RESPIRATOR AND OTHER PROTECTIVE CLOTHING. SHUT OFF SOURCE OF LEAK ONLY IF SAFE TO DO SO. DIKE AND CONTAIN. REMOVE WITH VACUUM TRUCKS OR PUMP TO STORAGE/SALVAGE VESSELS. SOAK UP RESIDUE WITH AN ABSORBENT SUCH AS CLAY, SAND, OR OTHER SUITABLE MATERIAL; PLACE IN NON-LEAKING CONTAINERS AND SEAL TIGHTLY FOR PROPER DISPOSAL. FLUSH AREA WITH WATER TO REMOVE TRACE RESIDUE; DISPOSE OF FLUSH SOLUTION AS ABOVE. *** SMALL SPILLS *** TAKE UP WITH AN ABSORBENT MATERIAL AND PLACE IN NON-LEAKING CONTAINERS FOR PROPER DISPOSAL.

SECTION XII**SPECIAL PRECAUTIONS**

KEEP LIQUID AND VAPOR AWAY FROM HEAT, SPARKS AND FLAME. SURFACES THAT ARE SUFFICIENTLY HOT MAY IGNITE EVEN LIQUID PRODUCT IN THE ABSENCE OF SPARKS OR FLAME. EXTINGUISH PILOT LIGHTS, CIGARETTES AND TURN OFF OTHER SOURCES OF IGNITION PRIOR TO USE AND UNTIL ALL VAPORS ARE GONE. VAPORS MAY ACCUMULATE AND TRAVEL TO IGNITION SOURCES DISTANT FROM THE HANDLING SITE; FLASH-FIRE CAN RESULT. KEEP CONTAINERS CLOSED WHEN NOT IN USE. USE WITH ADEQUATE VENTILATION.

CONTAINERS, EVEN THOSE THAT HAVE BEEN EMPTIED, CAN CONTAIN EXPLOSIVE VAPORS. DO NOT CUT; DRILL, GRIND, WELD OR PERFORM SIMILAR OPERATIONS ON OR NEAR CONTAINERS. DO NOT PRESSURIZE DRUM CONTAINERS TO EMPTY THEM.

STATIC ELECTRICITY MAY ACCUMULATE AND CREATE A FIRE HAZARD. GROUND FIXED EQUIPMENT. BOND AND GROUND TRANSFER CONTAINERS AND EQUIPMENT.

WASH WITH SOAP AND WATER BEFORE EATING, DRINKING, SMOKING, APPLYING COSMETICS, OR USING TOILET FACILITIES. LAUNDER CONTAMINATED CLOTHING BEFORE REUSE. AIR-DRY CONTAMINATED CLOTHING IN A WELL VENTILATED AREA BEFORE LAUNDERING.

SECTION XIII**TRANSPORTATION REQUIREMENTS**

DEPARTMENT OF TRANSPORTATION CLASSIFICATION:
CLASS 3 (FLAMMABLE LIQUIDS), III

D.O.T. PROPER SHIPPING NAME:
PETROLEUM DISTILLATES, N.O.S. (PETROLEUM NAPHTHA)

OTHER REQUIREMENTS:

UN1268, GUIDE 128. THIS PRODUCT CONTAINS TRIMETHYLBENZENES (10%) WHICH ARE MARINE POLLUTANTS UNDER 49 CFR 172.101. APPENDIX B.

SECTION XIV**OTHER REGULATORY CONTROLS**

IN ACCORDANCE WITH SARA TITLE III, SECTION 313, THE ENVIRONMENTAL DATA SHEET (EDS) SHOULD ALWAYS BE COPIED AND SENT WITH THE MSDS.

PROTECTION OF STRATOSPHERIC OZONE (PURSUANT TO SECTION 611 OF THE CLEAN AIR ACT AMENDMENTS OF 1990): PER 40 CFR PART 82, THIS PRODUCT DOES NOT CONTAIN NOR WAS IT DIRECTLY MANUFACTURED WITH ANY CLASS I OR CLASS II OZONE DEPLETING SUBSTANCES.

PRODUCT NAME: SHELL MINERAL SPIRITS 135

MSDS 7,550-13
PAGE 8

SECTION XV

STATE REGULATORY INFORMATION

THE FOLLOWING CHEMICALS ARE SPECIFICALLY LISTED BY INDIVIDUAL STATES; OTHER PRODUCT SPECIFIC HEALTH AND SAFETY DATA IN OTHER SECTIONS OF THE MSDS MAY ALSO BE APPLICABLE FOR STATE REQUIREMENTS. FOR DETAILS ON YOUR REGULATORY REQUIREMENTS YOU SHOULD CONTACT THE APPROPRIATE AGENCY IN YOUR STATE.

STATE LISTED COMPONENT

PERCENT

STATE CODE

PSEUDOCUMENE

(CAS NO: 98-63-8)

8V

CA, MA, PA

CA = CALIFORNIA HAZ. SUBST. LIST; CASG, CASR, CAGC/R = CALIFORNIA SAFE DRINKING WATER AND TOXICS ENFORCEMENT ACT OF 1986 OR PROPOSITION 65 LIST; CT = CONNECTICUT TOXIC. SUBST. LIST; FL = FLORIDA SUBST. LIST; IL = ILLINOIS TOX. SUBST. LIST; LA = LOUISIANA HAZ. SUBST. LIST; MA = MASSACHUSETTS SUBST. LIST; ME = MAINE HAZ. SUBST. LIST; MN = MINNESOTA HAZ. SUBST. LIST; NJ = NEW JERSEY HAZ. SUBST. LIST; PA = PENNSYLVANIA HAZ. SUBST. LIST; RI = RHODE ISLAND HAZ. SUBST. LIST.

SECTION XVI

SPECIAL NOTES

THIS MSDS REVISION HAS CHANGES IN SECTION XIII.

THE INFORMATION CONTAINED HEREIN IS BASED ON THE DATA AVAILABLE TO US AND IS BELIEVED TO BE CORRECT. HOWEVER, SHELL MAKES NO WARRANTY, EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF. SHELL ASSUMES NO RESPONSIBILITY FOR INJURY FROM THE USE OF THE PRODUCT DESCRIBED HEREIN.

DATE PREPARED: APRIL 21, 1995

J. C. WILLET

BE SAFE

READ OUR PRODUCT
SAFETY INFORMATION ... AND PASS IT ON
(PRODUCT LIABILITY LAW
REQUIRES IT)

SHELL OIL COMPANY
PRODUCT SAFETY AND COMPLIANCE
P. O. BOX 4320
HOUSTON, TX 77210



ENVIRONMENTAL DATA SHEET

EDS NUMBER ▶ 7,550-1

PAGE 1

37448 (9-87)

PRODUCT ▶ SHELL MINERAL SPIRITS 135

PRODUCT
CODE ▶ 89048

SECTION I

PRODUCT/COMPOSITION

NO.	COMPONENT	CAS NUMBER	PERCENT
P	SHELL MINERAL SPIRITS 135*	MIXTURE*	100
1	SOLVENT NAPHTHA (PETROLEUM), MEDIUM ALIPHATIC	64742-88-7	85
2	SOLVENT NAPHTHA (PETROLEUM), LIGHT AROMATIC	64742-95-6	15
.	CONTAINS		
A	TRIMETHYLBENZENES	25551-13-7	8-10
B	PSEUDOCUMENE (1,2,4-TRIMETHYLBENZENE)	95-83-6	6

*A COMPLEX COMBINATION OF PREDOMINATELY C8-C12 HYDROCARBONS; EXACT COMPOSITION WILL VARY.

SECTION II

SARA TITLE III INFORMATION

NO.	EMS RQ (LBS) (*1)	EMS TPQ (LBS) (*2)	SEC 313 (*3)	313 CATEGORY (*4)	311/312 CATEGORIES (*5)
P			YES		H-1, H-2, P-3
B					

P
B

YES

H-1, H-2, P-3

FOOTNOTES

- *1 = REPORTABLE QUANTITY OF EXTREMELY HAZARDOUS SUBSTANCE, SEC. 302
 *2 = THRESHOLD PLANNING QUANTITY, EXTREMELY HAZARDOUS SUBSTANCE, SEC. 302
 *3 = TOXIC CHEMICAL, SEC. 313
 *4 = CATEGORY AS REQUIRED BY SEC. 313 (40 CFR 372.65 C). MUST BE USED ON TOXIC RELEASE INVENTORY FORM
 *5 = HAZARD CATEGORY FOR SARA SEC. 311/312 REPORTING
- | | | |
|----------|---------------------------------------|---|
| HEALTH | H-1 = IMMEDIATE (ACUTE) HEALTH HAZARD | H-2 = DELAYED (CHRONIC) HEALTH HAZARD |
| PHYSICAL | P-3 = FIRE HAZARD | P-4 = SUDDEN RELEASE OF PRESSURE HAZARD |
| | P-5 = REACTIVE HAZARD | |

SECTION III

ENVIRONMENTAL RELEASE INFORMATION

UNDER EPA-CWA, THIS PRODUCT IS CONSIDERED AN DJL UNDER SECTION 311. SPILLS INTO OR LEADING TO SURFACE WATERS THAT CAUSE A SHEEN MUST BE REPORTED TO THE NATIONAL RESPONSE CENTER, 800-424-8802.

THIS MATERIAL IS COVERED BY CERCLA'S PETROLEUM EXCLUSION, THEREFORE, RELEASES TO AIR, LAND OR WATER ARE NOT REPORTABLE UNDER EPA-CERCLA ("SUPERFUND").

SECTION IV

RCRA INFORMATION

UNDER EPA - RCRA (40 CFR 261.21), IF THIS PRODUCT BECOMES A WASTE MATERIAL, IT WOULD BE AN IGNITABLE HAZARDOUS WASTE, HAZARDOUS WASTE NUMBER D001. REFER TO LATEST EPA OR STATE REGULATIONS REGARDING PROPER DISPOSAL.

PRODUCT NAME: SHELL MINERAL SPIRITS 135

EDS 7,550-1
PAGE 2

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DATE PREPARED: JUNE 13, 1988
-----SHELL OIL COMPANY
CORPORATE ENVIRONMENTAL AFFAIRS
P. O. BOX 4980
HOUSTON, TX 77210FOR ADDITIONAL INFORMATION ON THIS ENVIRONMENTAL DATA PLEASE CALL
(713) 261-2282FOR EMERGENCY ASSISTANCE PLEASE CALL
SHELL: (713) 478-8481
CHEMTREC: (800) 424-9300

*****MATERIAL SAFETY DATA SHEET*****
For Coatings, Resins and Related Materials

SECTION I-PRODUCT AND PREPARATION INFORMATION

MANUFACTURER: RUST-OLEUM CORPORATION EMERGENCY AND INFORMATION
ADDRESS: 11 Hawthorn Parkway TELEPHONE: (708)367-7700
Vernon Hills, IL
60061

PRODUCT CLASS: Alkyd resin-Primer
MANUFACTURERS CODE: 7769 and 7773
TRADE NAME: Rusty Metal and Clean Metal Primers-Brush goods
DATE OF PREPARATION: July 16, 1991 (JCO)

SECTION II-HAZARDOUS INGREDIENTS

INGREDIENT/CAS No	WT %	EXPOSURE LIMITS			mm Hg@20C
		ACGIH-TLV	OSHA-PEL	LEL	
Spirits/8052-41-3	35-40%*	100ppm	100ppm	1.0%	2.0

* Nearest 5%

NE-not established NA-not applicable

SECTION III-PHYSICAL DATA

Boiling range: 307-389 F Vapor density- heavier lighter than air
(153-198 C)
Evaporation Rate: faster % Volatile: 57-60% Wt/gal: 10-11.0 lbs.
(Ether=1) slower (by volume) pH: NA

SECTION IV-FIRE AND EXPLOSION HAZARDS

Flammability Classification: OSHA Class II Flashpoint: 104 F (TCC)
Combustible liquid
DOT Classification: Combustible paint liquid

Extinguishing Media: NFPA Class B extinguishers (Carbon dioxide, dry chemical or foam)

Special Fire Fighting Procedures:

Full protective equipment including self-contained breathing apparatus should be used. Water spray may be ineffective. Water may be used to cool closed containers to prevent pressure build-up and possible autoignition or explosion. If water is used, fog nozzles are preferred.

Unusual Fire and Explosion Hazards:

Keep containers tightly closed. Isolate from heat, electrical equipment, sparks and open flame. Closed containers may explode when exposed to extreme heat. DO NOT apply to hot surfaces.

R. T. VANDERBILT COMPANY, INC.
Industrial Minerals and Chemicals
30 Winfield Street
Norwalk, CT 06855
203-853-1400 FAX 203-853-1452

* * * * *
* MATERIAL *
* SAFETY *
* DATA SHEET *
* * * * *

Page 1 of 5

Customer Info:
35805020123 41706

SHAFFER

12950 WEST LITTLE YORK
HOUSTON TX 77041

Date: 01/15/99 Revised: 12/27/95 Supersedes: 05/09/95

I. PRODUCT IDENTIFICATION G00057

Trade Name: METHYL TUADS* (All Solid Grades)

Chemical Name: Thiram

Synonyms: Tetramethylthiuram disulfide; bis(dimethylthiocarbamoyl)
disulfide; Thiram; TMD, CAS Reg. No. 137-26-8

Hazardous Ingredients/OSHA: Thiram; Petroleum Process Oil CAS Reg. No.
64742-65-0.

Hazard: Irritation and possible allergic sensitization.

Carcinogenic Ingredients/OSHA/NTP/IARC: IARC Group 3 (inadequate
animal evidence for carcinogenicity).

SARA Title III Section 313 Ingredients: 97% Thiram,
CAS Reg. No. 137-26-8

TSCA Inventory Status: Listed

DOT Classification: RQ (10 lbs). Environmentally hazardous substance,
n.o.s., Class 9, UN3077

II. WARNING STATEMENTS

WARNING] May cause irritation of nose, throat or skin. May
cause allergic skin reaction. Consumption of alcohol after
repeated exposure may cause skin irritation or flushing.

III. PHYSICAL AND CHEMICAL DATA

Appearance and Odor: White to cream powder or rodform.
Slight aromatic odor.

Density, at 20 deg C, Mg/cu m: 1.40 - 1.44

Solubility in Water: Negligible

(* - Registered in U.S. Patent and Trademark Office)

Information presented herein has been compiled from sources considered to be dependable and is accurate and reliable to the best of our knowledge and belief but is not guaranteed to be so. Nothing herein is to be construed as recommending any practice or any product in violation of any patent or in violation of any law or regulation. It is the user's responsibility to determine for himself the suitability of any material for a specific purpose and to adopt such safety precautions as may be necessary. We make no warranty as to the results to be obtained in using any material and, since conditions of use are not under our control, we must necessarily disclaim all liability with respect to the use of any material supplied by us.

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IV. FIRE PROTECTION

NFPA ID SYSTEM

Flash Point (deg C/deg F): 140/284 PMOC

1
2 0

Extinguishing Media: Carbon dioxide, foam, and dry chemical.

Special Firefighting Procedure: Protective clothing and self-contained breathing apparatus.

Unusual Fire Hazard: Dust or powder may form explosive concentrations when mixed in sufficient ratios with air. Maximum explosion pressure of dust is 80 psi, and maximum rate of pressure rise is 2,050 psi/sec.

V. REACTIVITY DATA

Thermal Stability: Stable

Materials to Avoid: Contact with strong acids or oxidizing materials may cause formation of toxic gases such as hydrogen sulfide. Contact with strong oxidizers may cause fires and explosions.

Hazardous Polymerization: Will not occur

Hazardous Decomposition Products: Oxides of carbon, nitrogen and sulfur upon combustion.

VI. HEALTH HAZARD DATA

Exposure Limits:

For Thiram -

OSHA TWA 5 mg/cu m

ACGIH 1989-90 ed. TLV/TWA 1 mg/cu m

For Mineral Oil (as mist) -

OSHA TWA 5 mg/cu m; STEL 10 mg/cu m

ACGIH 1989-90 ed. TWA 5 mg/cu m; STEL 5 mg/cu m

Effects of Overexposure:

Consumption of alcohol after repeated exposure to Thiram may cause skin irritation or flushing. Dust is irritating to nose, throat and skin. May cause allergic skin reaction in some people. May cause eye irritation, tearing and light sensitivity.

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VII. PHYSIOLOGICAL EFFECTS SUMMARY

Worker exposure to thiram has produced the following irritation to skin, eyes, nose and throat. Consumption of alcohol after repeated exposure to dust may cause skin irritation or flushing.

Oral LD50 (rat) : 1,800 mg/kg females and 3,700 mg/kg males slightly toxic.

Dermal LD50 (rabbit): >7,940 mg/kg, practically non-toxic

Eye Irritation (rabbit): (FHSA) 6.5 on scale of 110.0, slightly irritating

Skin Irritation (rabbit): (FHSA) 0.0 on a scale of 8.0, practically non-irritating

Inhalation LC50(rats)- Not Determined - >100 mg/cu m (4 hour exposure) for similar product. 1.5 g/cu m - Immediately dangerous to life and health per NIOSH. Guinea pig test showed that it is a moderate skin sensitizer.

Patch testing of 50 human volunteers did not produce a reaction on initial application. Serial applications caused a reaction in 3/50; subsequent challenge produced a positive response in 3/50. Thiram is a primary irritant and a sensitizing agent in some individuals.

Thiram was mutagenic in two in vitro assays. In a microbial assay utilizing five Salmonella strains and one yeast strain, a mutagenic response was observed in Salmonella strain TA-1535, with and without mammalian microsomal activation and in strain TA-1000 with activation. Mutagenic potential to human organisms is presently unknown. In the mouse lymphoma assay thiram was negative in the presence of a rat liver activation system but induced forward mutation at the TK locus without activation.

Maternal and fetotoxic effects were observed in rats administered thiram at 136 mg/kg, in mice at 350 mg/kg, and in hamsters at 250 mg/kg. At these dosages, incidental skeletal and soft tissue changes were observed. At lower dosage levels, reduced weight gain and reduced fetal weights were observed, but no evidence of teratogenicity.

No chronic adverse effects were observed in mice fed thiram at 30, 100 or 300 ppm dietary levels for 24 months. No evidence of carcinogenic response was observed in this test.

Neurotoxicity was observed in female rats fed 66.9 mg/kg/day thiram, but was not observed in male rats.

Medical Condition Generally Aggravated By Exposure: Unknown

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VII. PHYSIOLOGICAL EFFECTS SUMMARY (continued)

For Mineral Oil -

Eye irritation (rabbit) - 250 mg/5D Mild
Oral LD50 (mouse) 2,200 mg/kg

VIII. PRECAUTIONS FOR SAFE HANDLING

Avoid prolonged or repeated contact with skin. Avoid breathing dust or vapor. Use with adequate ventilation. Wash thoroughly after handling. Store in a cool, dry place. Consumption of alcohol after repeated exposure to TMTD may cause skin irritation or flushing.

IX. PROTECTION AND CONTROL MEASURES

Protective Equipment: Rubber gloves, goggles

Respiratory Protection: Use organic vapor cartridge with dust, mist, and fume filter or other NIOSH recommended respirator depending on concentration of dust in the air.

Ventilation: If local exhaust ventilation is used, a capture velocity of 150 - 200 fpm is recommended.

X. EMERGENCY AND FIRST AID PROCEDURES

Eye Contact: Flush eyes with plenty of water for at least 15 minutes. Consult a physician.

Skin Contact: Wash with soap and water. Launder contaminated clothing before reuse.

Inhalation: Expose to fresh air. If not breathing give artificial respiration. Give oxygen, if needed. Get medical attention.

Ingestion: Induce vomiting. Give plenty of water. Never give anything by mouth to an unconscious person. After vomiting, follow with gastric lavage. Prohibit ethyl alcohol for 10 days. Get medical attention and inform doctor if patient has used alcohol within 48 hours.

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XI. SPILL AND DISPOSAL PROCEDURES

Spill or Leakage Procedure: Scoop up. Wash residuals with soap and water. Transfer to a closed container for disposal.

Waste Disposal: Dispose of waste according to RCRA 40 CFR 261.33(f)

For Additional Information Contact:

Legal Affairs
R. T. VANDERBILT CO., INC.
30 Winfield Street
P.O. Box 5150
Norwalk, CT 06856
Tel. No.: (203) 853-1400

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MATERIAL SAFETY DATA SHEET

Rohm and Haas Company

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

6116-6-3

Product Code : 52368
KEY : 852774-8

MSDS Date : 04/28/00

COMPANY IDENTIFICATION

ROHM AND HAAS COMPANY
100 INDEPENDENCE MALL WEST
PHILADELPHIA, PA 19106-2399

EMERGENCY TELEPHONE NUMBERS

HEALTH EMERGENCY : 215-592-3000
SPILL EMERGENCY : 215-592-3000
CHEMTREC : 800-424-9300

2. COMPOSITION/INFORMATION ON INGREDIENTS

This product is considered hazardous under the OSHA Hazard Communication Standard (29 CFR 1910.1200).

No		CAS REG NO	WEIGHT (%)
1	Methyl ethyl ketone	78-93-3	22.3
2	Cyclohexane	110-82-7	14.7
3	Toluene	108-88-3	14.6
4	Mineral spirits	8052-41-3	11.2
5	Light aromatic solvent naphtha (C8-C10)	64742-95-6	5.1
6	Resorcinol	108-46-3	3.7
7	Hexamethylenetetramine	100-97-0	3.7
8	Methyl isobutyl ketone	108-10-1	3.7
9	Dibasic lead phosphite	12141-20-7	3.1
10	Titanium Dioxide	13463-67-7	1.8
11	1,2,4-trimethylbenzene	95-63-6	1.7
12	1,3,5-Trimethyl benzene	108-67-8	0.9
13	Dichlorohydrin	96-23-1	0.4
14	Carbon black	1333-86-4	0.3
15	Xylene	1330-20-7	0.3
16	Epichlorohydrin	106-89-8	0.2
17	Non-hazardous and other ingredients	Not Applicable	Balance below reportable levels

3. HAZARDS IDENTIFICATION

Emergency Overview

FLAMMABLE LIQUID AND VAPOR. HARMFUL IF INHALED. MAY CAUSE ALLERGIC RESPIRATORY REACTION AND SENSITIZATION. MAY CAUSE ALLERGIC SKIN REACTION AND SENSITIZATION. CAUSES SEVERE EYE IRRITATION. INHALATION MAY CAUSE DIZZINESS, HEADACHE AND INCOORDINATION. INGESTION CAN CAUSE DIZZINESS, FAINTNESS, HEADACHE AND INCOORDINATION. INGESTION MAY CAUSE INFLAMMATION OF THE LUNGS. MAY CAUSE MODERATE SKIN IRRITATION. MAY CAUSE RESPIRATORY TRACT IRRITATION. MAY CAUSE DIGESTIVE TRACT IRRITATION. INGESTION MAY CAUSE NAUSEA, VOMITING, PAIN, UPSET STOMACH, DIARRHEA. INHALATION MAY CAUSE NAUSEA, VOMITING, UPSET STOMACH.



1,3,5-Trimethyl benzene	No	No	No	No
Dichlorohydrin	No	No	No	No
Carbon black	A4	2B	No	No
Xylene	A4	No	No	No
Epichlorohydrin	A3	2A	Yes	No

4. FIRST AID MEASURES

Eye Contact

Immediately flush eyes with plenty of water for at least 15 minutes. Get immediate medical attention.

Skin Contact

Immediately flush with plenty of water for at least 15 minutes. For large exposures use an emergency shower. Remove contaminated clothing and shoes. Get immediate medical attention. Professionally wash clothing before re-use.

Inhalation (Breathing)

Remove to fresh air. If symptoms develop, seek immediate medical attention. If not breathing, give artificial respiration.

Ingestion (Swallowing)

Seek medical attention. Immediately induce vomiting, as directed by medical personnel. Never give anything by mouth to an unconscious person.

Notes To Physicians

Treatment should be directed at preventing absorption, administering to symptoms (if they occur), and providing supportive therapy. Once absorbed, lead can cause acute damage to the kidneys and central nervous system. The best treatment is to prevent absorption. If absorption occurs, lead can be removed from the body with the use of calcium EDTA administered intravenously. Do not give EDTA by mouth.

5. FIRE FIGHTING METHODS

Flash Point	20F -6.6C Setaflash Closed Cup
Explosive Lmts	LEL(%) 1 UEL(%) Not Determined
Autoignition	Not Determined

Hazardous Combustion And Decomposition Products

Smoke, soot, and toxic/irritating fumes (i.e., carbon dioxide, carbon monoxide, etc.). Oxides of nitrogen.

Fire And Explosion Hazards

High temperatures can cause sealed containers to rupture due to a build up of internal pressure. Cool with water. Vapors can travel to a source of ignition (flame, electric motor, hot surface, cigarette, etc.) and flash back. During a fire, irritating and highly toxic gases may be generated during combustion or decomposition.



when mixed with air. Ignition can occur at typical elevated temperature process conditions. Any use in such processes should be evaluated thoroughly to assure safe operating conditions.

Transfer

Containers should be supported and grounded before opening, dispensing, mixing, pouring, and emptying. Open with non-sparking tools. If container is warm, open bung slowly to release internal pressure.

Personal Hygiene

Wash thoroughly after handling, especially before eating, drinking, smoking, and using restroom facilities. Wash contaminated goggles, faceshield, and gloves. Professionally launder contaminated clothing before re-use.

Empty Container Precautions

Attention! This container hazardous when empty. Follow label warnings even after container is emptied since empty containers may retain product residues. Do not use heat, sparks, open flames, torches, cigarettes on or near empty container. Do not reuse empty container without professional cleaning for food, clothing, or products for human or animal consumption or where skin contact can occur.



Epichlorohydrin

5 ppm - Skin

OSHA - STEL

Toluene

300 ppm - Ceiling

Engineering Controls/Ventilation

Local exhaust ventilation is recommended when vapors, mists, or dusts can be released in excess of established airborne exposure limits (TLVs or PELs).

Eye Protection

An eye wash facility should be readily available. Wear chemical splash goggles.

Skin Protection

Wear protective clothing and appropriate impervious gloves. Because a variety of protective gloves exist, consult glove manufacturer to determine the proper type for a specific operation. An emergency shower should be readily available.

Respiratory Protection

Avoid breathing vapor and/or mists. Wear NIOSH/MSHA-approved equipment. Determine the appropriate type by consulting the respirator manufacturer. High airborne concentrations may necessitate the use of self-contained breathing apparatus (SCBA) or a supplied air respirator. Respiratory protection programs must be in compliance with 29 CFR 1910.134.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Gray
Odor	Solvent
Physical State	Liquid
Solubility	Insoluble
pH	Not Applicable
Boiling Point	174F 78.8C
Vapor Pressure	Not Determined
Vapor Density	Not Determined
Evaporation Rt	Not Determined
VOC Material	690 g/L 5.8 lbs/gal
Specific Grvty	0.936
%Non-Vol(w/w)	25.5
Weight	7.8 lbs/gal 934.8 g/L

NOTE: The physical data presented above are typical values and should not be construed as a specification.

10. STABILITY AND REACTIVITY

Chemical Stability

Stable under normal conditions of use.



Dermal LD50 Rabbit 3,360 mg/kg

Hexamethylenetetramine:

Chronic overexposure may cause kidney damage. Possible skin and respiratory sensitizer.

Methyl isobutyl ketone:

Can cause liver and kidney injury.

Oral LD50	Rat	2,080 mg/kg
	Mouse	2,671 mg/kg
	Guinea pig	1,600 mg/kg
Inhalation LC50	Mouse	23,300 mg/M3

Dibasic lead phosphite:

Ingestion can cause gastrointestinal disturbances (diarrhea, bloody stools, etc.), CNS effects, hematuria, and liver and kidney effects. Chronic exposure can affect the liver, kidneys, and the CNS, reproductive, immune, and cardiovascular systems. Blood and blood-forming systems can also be affected.

Titanium Dioxide:

In a 2-year study in rats, an increase in benign and malignant lung tumors was observed at 250 mg/M3 respirable dust level. This level is 50 times the current occupational exposure level and is not expected to correlate to human exposures.

1,2,4-trimethylbenzene:

Oral LD50	Rat	5 g/Kg
Inhalation LC50	Rat	18 g/M3/4-Hours

1,3,5-Trimethyl benzene:

Eye, skin, and respiratory tract irritant. Can cause liver and kidney injury.

Oral LD50	Rat	8,970 mg/kg
-----------	-----	-------------

Dichlorohydrin:

Can cause liver and kidney damage and hemolytic anemia. The results of a 2-year study with experimental animals indicated that the material is an animal carcinogen.

Oral LD50	Rat	110 mg/kg
	Mouse	100 mg/kg
Dermal LD50	Rabbit	800 mg/kg

Carbon black:

Inhalation studies in rats have shown increased rates of benign and malignant lung tumors. Solvent extracts of carbon black have been shown to be carcinogenic to the skin of mice. However, epidemiological studies of carbon black workers in the United States show no increased incidence of cancer deaths compared to the general population. Dust can irritate eyes and skin.

Xylene:

This chemical has been shown to cause fetal injury when tested in laboratory animals. Adverse effects to kidneys and liver will be increased by the presence of ethanol. Chronic exposure has been shown to cause



DOT Label No L
Hazard Class 3 (IATA/49CFR) 3.2 (IMO)
Packing Group II

All the information in this section is for NON-BULK packagings (119 gallons or less; 882 lbs. or less for solids). For BULK shipments, one (or more) ingredient(s) is a hazardous substance, which may require that the letters -RQ- precede the proper shipping name. For the RQ ingredients and their amounts, see MSDS section 6 or Appendix A to Part 172.101 of the 49 CFR.

15. REGULATORY INFORMATION

Federal

SARA Title III - Section 311/312 - Hazard Categories

Y- Fire Hazard
N- Sudden Release of Pressure Hazard
N- Reactivity Hazard
Y- Immediate (acute) Health Hazard
Y- Delayed (chronic) Health Hazard

Ozone-Depleting Chemicals

No regulated ingredients.

SARA Section 302 Extremely Hazardous Mat

Epichlorohydrin

SARA Section 313 Toxic Chemicals

Methyl ethyl ketone
Cyclohexane
Toluene
Methyl isobutyl ketone
Dibasic lead phosphite
 Lead compounds
1,2,4-trimethylbenzene
Xylene
Epichlorohydrin
TSCA Section 12(b) Export Notification
Cyclohexane
Methyl isobutyl ketone
1,3,5-Trimethyl benzene
Dichlorohydrin
Bisphenol A based epoxy
TSCA Section 8(d) Data Reporting Rule
Methyl ethyl ketone
Toluene
Methyl isobutyl ketone



CEPA - NPRI

Methyl ethyl ketone
Cyclohexane
Toluene
Methyl isobutyl ketone
Dibasic lead phosphite
Lead compounds
1,2,4-trimethylbenzene
Xylene

Canadian Chemical Inventory

Domestic Substance List

Listed.

16. OTHER INFORMATION

Hazard Rating		
	HMIS	NFPA
Health	2*	2
Fire	3	3
Reactivity	1	0

* = Chronic

ABBREVIATIONS:

ACGIH = American Conference of Governmental Industrial Hygienists
OSHA = Occupational Safety and Health Administration
TLV = Threshold Limit Value
PEL = Permissible Exposure Limit
TWA = Time Weighted Average
STEL = Short-Term Exposure Limit
BAc = Butyl acetate

The information contained herein relates only to the specific material identified. Rohm and Haas Company believes that such information is accurate and reliable as of the date of this material safety data sheet, but no representation, guarantee or warranty, expressed or implied, is made as to the accuracy, reliability, or completeness of the information. Rohm and Haas Company urges persons receiving this information to make their own determination as to the information's suitability and completeness for their particular application.

10.00000428

M2A - 000502185445



MATERIAL SAFETY DATA SHEET

Rohm and Haas Company

CHEMICAL PRODUCT AND COMPANY INFORMATION

Thixon 715-1-EF

Product Code : 52541
KEY : 852601-7

MSDS Date : 11/12/01

COMPANY IDENTIFICATION

ROHM AND HAAS COMPANY
100 INDEPENDENCE MALL WEST
PHILADELPHIA, PA 19106-2399

EMERGENCY TELEPHONE NUMBERS

HEALTH EMERGENCY : 215-592-3000
SPILL EMERGENCY : 215-592-3000
CHEMTREC : 800-424-9300

2. COMPOSITION/INFORMATION ON INGREDIENTS

This product is considered hazardous under the OSHA Hazard Communication Standard (29 CFR 1910.1200).

No		CAS REG NO	WEIGHT (%)
1	Methyl alcohol	67-56-1	42.2
2	Methyl ethyl ketone	78-93-3	23.2
③	Cresol	1319-77-3	1.3
4	Phenol	108-95-2	0.9
5	Non-hazardous and other ingredients below reportable levels	Not Applicable	Balance

METHYL ALCOHOL - NOT ON SAFETY LIST

3. HAZARDS IDENTIFICATION

Emergency Overview

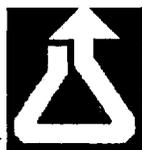
INGESTION CAN CAUSE BLINDNESS. FLAMMABLE LIQUID AND VAPOR. INHALATION MAY CAUSE DIZZINESS, HEADACHE AND INCOORDINATION. INGESTION CAN CAUSE DIZZINESS, FAINTNESS, HEADACHE AND INCOORDINATION. MAY CAUSE MODERATE EYE IRRITATION. MAY CAUSE MODERATE SKIN IRRITATION. MAY CAUSE RESPIRATORY TRACT IRRITATION. MAY CAUSE DIGESTIVE TRACT IRRITATION. INGESTION MAY CAUSE NAUSEA, VOMITING, PAIN, UPSET STOMACH, DIARRHEA. INHALATION MAY CAUSE NAUSEA, VOMITING, UPSET STOMACH. PROLONGED OR REPEATED CONTACT MAY DRY SKIN AND CAUSE IRRITATION. See sections 3, 5, & 6.

Primary Routes Of Exposure

Eye. Skin. Inhalation (breathing).

Eye Contact

May cause moderate irritation. May cause corneal opacity (clouding of the eye surface). Can cause burning sensation, tearing, and redness.



Notes To Physicians

Treatment should be directed at preventing absorption, administering to symptoms (if they occur), and providing supportive therapy. Methanol causes optic neuritis and severe metabolic acidosis. Ethyl alcohol administered intravenously is the antidote. The intravenous administration of sodium bicarbonate is useful in controlling acidosis.

5. FIRE FIGHTING METHODS

Flash Point	59F 15C Setaflash Closed Cup
Explosive Lmts	LEL(%) 1.8 UEL(%) Not Determined
Autoignition	Not Determined

Hazardous Combustion And Decomposition Products

Smoke, soot, and toxic/irritating fumes (i.e., carbon dioxide, carbon monoxide, etc.). Formaldehyde and/or other aldehydes.

Fire And Explosion Hazards

High temperatures can cause sealed containers to rupture due to a build up of internal pressure. Cool with water. Vapors can travel to a source of ignition (flame, electric motor, hot surface, cigarette, etc.) and flash back. During a fire, irritating and highly toxic gases may be generated during combustion or decomposition.

Extinguishing Media

SMALL FIRES: Dry chemical, carbon dioxide, water spray, or foam. LARGE FIRES: Water spray, fog, or alcohol foam.

Fire Fighting Procedures/Equipment

Fire fighters and others who may be exposed to the products of combustion should be equipped with NIOSH-approved positive pressure self-contained breathing apparatus (SCBA) and full protective clothing.

6. ACCIDENTAL RELEASE MEASURES

Evacuation

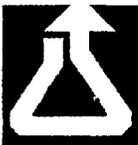
Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Eliminate all sources of ignition.

Containment

Safely stop discharge. Contain material, as necessary, with a dike or barrier. Stop material from contaminating soil, or from entering sewers or bodies of water.

Clean-Up/Personal Protection Equipment

Appropriate safety measures and protective equipment should be used. Use supplied air respirator or self-contained breathing apparatus in enclosed spaces or if airborne exposure limits can be exceeded. See Section 8.



8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

ACGIH - TLV

Methyl alcohol	200 ppm - Skin
Methyl ethyl ketone	200 ppm
Cresol	5 ppm - Skin
Phenol	5 ppm - Skin

ACGIH - STEL

Methyl alcohol	250 ppm - Skin
Methyl ethyl ketone	300 ppm

OSHA - PEL

Methyl alcohol	200 ppm
Methyl ethyl ketone	200 ppm
Cresol	5 ppm - Skin
Phenol	5 ppm - Skin

Engineering Controls/Ventilation

Local exhaust ventilation is recommended when vapors, mists, or dusts can be released in excess of established airborne exposure limits (TLVs or PELs).

Eye Protection

Wear chemical splash goggles. An eye wash facility should be readily available.

Skin Protection

Wear protective clothing and appropriate impervious gloves. Because a variety of protective gloves exist, consult glove manufacturer to determine the proper type for a specific operation.

Respiratory Protection

Avoid breathing vapor and/or mists. Wear NIOSH/MSHA-approved equipment. Determine the appropriate type by consulting the respirator manufacturer. High airborne concentrations may necessitate the use of self-contained breathing apparatus (SCBA) or a supplied air respirator. Respiratory protection programs must be in compliance with 29 CFR 1910.134.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Amber
Odor	Solvent
Physical State	Liquid
Solubility	Insoluble
pH	Not Applicable



Oral LD50	Rat	1,454 mg/kg
	Mouse	760 mg/kg
Dermal LD50	Rabbit	2,000 mg/kg

Phenol:
Chronic exposure can cause cardiovascular, liver, and kidney damage.

Oral LD50	Rat	317 mg/kg
	Mouse	270 mg/kg
Dermal LD50	Rat	669 mg/kg
	Rabbit	850 mg/kg
Inhalation LC50	Rat	316 mg/M3
	Mouse	177 mg/M3

12. ECOLOGICAL INFORMATION

No data are available on this product.

13. DISPOSAL CONSIDERATIONS

Disposal

When a decision is made to discard this material as supplied, it meets RCRA's characteristic definition of ignitability.

General Statements

Federal regulations may apply to empty container. State and/or local regulations may be different.

General Recommendations

Of the methods of disposal currently available, it is recommended that an alternative be selected according to the following order of preference, based upon environmental acceptability: (1) recycle or rework, if feasible; (2) incinerate at an authorized facility; or (3) treat at an acceptable waste treatment facility.

Special Instructions

Be sure to contact the appropriate government environmental agencies if further guidance is required.

14. TRANSPORT INFORMATION

Weight (lb)	Shipping Name	49	CFR	IATA	IMO
	Flammable liquids, toxic, n.o.s. (methanol, methyl ethyl ketone)			Y	Y
	Adhesives		Y		
DOT Label	Flammable liquid, toxic	UN/NA Id Num	UN 1992		
DOT Label No	WD36				



Environmental Hazard. Cresol	1319-77-3	1.3
Environmental Hazard. Phenol	108-95-2	0.9
Environmental Hazard. Non-hazardous trade secret ingredient(s)	Proprietary	Balance

California - California Proposition 65

No regulated ingredients.

CONEG

No data available.

Canada

This is a -controlled product- under the Canadian Workplace Hazardous
Materials Information System (WHMIS).

Class B Division 2 Class D Division 1 Sub-division A
Class D Division 2 Sub-division B

CEPA - NPRI

Methyl alcohol
Methyl ethyl ketone
Cresol
Phenol

Canadian Chemical Inventory

Domestic Substance List

Listed.

16. OTHER INFORMATION

Hazard Rating		
	HMIS	NFPA
Health	2 *	2
Fire	3	3
Reactivity	0	0

* = Chronic

Product Use

Adhesive



MATERIAL SAFETY DATA SHEET

Rohm and Haas Company

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

THIXON 516 - EF

Product Code : 52527
Key : 852615-1

MSDS Date : 11/06/01

1 GALLON
BUCKETS
6 ON HAND
RUBBER
PLANT
PAINT
BOOTH
LIQUID

COMPANY IDENTIFICATION

ROHM AND HAAS COMPANY
100 INDEPENDENCE MALL WEST
PHILADELPHIA, PA 19106-2399

EMERGENCY TELEPHONE NUMBERS

HEALTH EMERGENCY : 215-592-3000
SPILL EMERGENCY : 215-592-3000
CHEMTREC : 800-424-9300

2. COMPOSITION/INFORMATION ON INGREDIENTS

This product is considered hazardous under the OSHA Hazard Communication Standard (29 CFR 1910.1200).

No		CAS REG NO	WEIGHT (%)
1	Toluene	108-88-3	78.0
2	Xylene	1330-20-7	5.6
3	Carbon black	1333-86-4	4.0
4	Nitrogen substituted aromatic	Proprietary	3.0
5	Ethyl benzene	100-41-4	1.4
6	Non-hazardous and other ingredients below reportable levels	Not Applicable	Balance

3. HAZARDS IDENTIFICATION

Emergency Overview

FLAMMABLE LIQUID AND VAPOR. CAUSES SEVERE EYE IRRITATION. CAUSES SEVERE DIGESTIVE TRACT IRRITATION. INHALATION MAY CAUSE DIZZINESS, HEADACHE AND INCOORDINATION. INGESTION CAN CAUSE DIZZINESS, FAINTNESS, HEADACHE AND INCOORDINATION. INGESTION MAY CAUSE INFLAMMATION OF THE LUNGS. MAY CAUSE RESPIRATORY TRACT IRRITATION. INGESTION MAY CAUSE NAUSEA, VOMITING, PAIN, UPSET STOMACH, DIARRHEA. INHALATION MAY CAUSE NAUSEA, VOMITING, UPSET STOMACH. MAY CAUSE SKIN IRRITATION. PROLONGED OR REPEATED CONTACT MAY DRY SKIN AND CAUSE IRRITATION. See sections 3, 5, & 6.

Primary Routes Of Exposure

Eye. Skin. Inhalation (breathing).

Eye Contact

Causes severe irritation. Can cause burning sensation, tearing, and redness.

Skin Contact

May cause slight to mild irritation. Prolonged or repeated contact may dry the skin and lead to irritation (i.e. dermatitis). May be absorbed through the skin. Can cause redness, itching, and burning sensation.



Notes To Physicians

Treatment should be directed at preventing absorption, administering to symptoms (if they occur), and providing supportive therapy.

5. FIRE FIGHTING METHODS

Flash Point	40F 4.4C Setaflash Closed Cup
Explosive Lmts	LEL(%) 1.2 UEL(%) Not Determined
Autoignition	Not Determined

Hazardous Combustion And Decomposition Products

Smoke, soot, and toxic/irritating fumes (i.e., carbon dioxide, carbon monoxide, etc.). Oxides of nitrogen. Oxides of sulfur. Hydrogen chloride.

Fire And Explosion Hazards

High temperatures can cause sealed containers to rupture due to a build up of internal pressure. Cool with water. Vapors can travel to a source of ignition (flame, electric motor, hot surface, cigarette, etc.) and flash back. During a fire, irritating and highly toxic gases may be generated during combustion or decomposition.

Extinguishing Media

Water may be ineffective. SMALL FIRES: Dry chemical, carbon dioxide, water spray, or foam. LARGE FIRES: Water spray, fog, or alcohol foam.

Fire Fighting Procedures/Equipment

Fire fighters and others who may be exposed to the products of combustion should be equipped with NIOSH-approved positive pressure self-contained breathing apparatus (SCBA) and full protective clothing.

6. ACCIDENTAL RELEASE MEASURES

Evacuation

Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Eliminate all sources of ignition.

Containment

Safely stop discharge. Contain material, as necessary, with a dike or barrier. Stop material from contaminating soil, or from entering sewers or bodies of water.

Clean-Up/Personal Protection Equipment

Appropriate safety measures and protective equipment should be used. Use supplied air respirator or self-contained breathing apparatus in enclosed spaces or if airborne exposure limits can be exceeded. See Section 8.



Xylene 150 ppm
Ethyl benzene 125 ppm

OSHA - PEL

Toluene 200 ppm
Xylene 100 ppm
Carbon black 3.5 mg/M3
Ethyl benzene 100 ppm

OSHA - STEL

Toluene 300 ppm - Ceiling

Engineering Controls/Ventilation

Local exhaust ventilation is recommended when vapors, mists, or dusts can be released in excess of established airborne exposure limits (TLVs or PELs).

Eye Protection

Wear chemical splash goggles. An eye wash facility should be readily available.

Skin Protection

Wear protective clothing and appropriate impervious gloves. Because a variety of protective gloves exist, consult glove manufacturer to determine the proper type for a specific operation. Neoprene gloves. Butyl rubber gloves. An emergency shower should be readily available.

Respiratory Protection

Avoid breathing vapor and/or mists. Industrial hygiene consultation is recommended because airborne exposure levels vary depending on the nature of the operation performed. Wear NIOSH/MSHA-approved equipment. Determine the appropriate type by consulting the respirator manufacturer. High airborne concentrations may necessitate the use of self-contained breathing apparatus (SCBA) or a supplied air respirator. Respiratory protection programs must be in compliance with 29 CFR 1910.134. Organic vapor/mist respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Black
Odor	Solvent
Physical State	Liquid
Solubility	Insoluble
pH	Not Applicable
Boiling Point	231F 110.5C
Vapor Density	> 1
Evaporation Rt	1 (Ethyl ether)
VOC Material	791 g/L 6.6 lbs/gal
Specific Grvty	< 1
%Non-Vol(w/w)	15



carbon black workers in the United States show no increased incidence of cancer deaths compared to the general population. Dust can irritate eyes and skin.

Nitrogen substituted aromatic:

Eye, skin, and respiratory tract irritant. Positive results were obtained in the Ames test. May cause cyanosis.

Oral LD50	Rat	1,020 mg/kg
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Ethyl benzene:

In 2-year inhalation studies, there was -clear evidence of carcinogenic activity- of ethylbenzene in male rats based on increased incidences of renal tubule neoplasms and testicular adenoma. There was -some evidence of carcinogenic activity- in female rats based on renal tubule adenoma. There was -some evidence of carcinogenic activity- in male mice based on increased incidences of alveolar/bronchiolar neoplasms and in female mice based on increased incidences of hepatocellular neoplasms. Additionally, effects were observed to the pituitary and thyroid were observed in animals exposed to the same concentrations (>250 ppm) as above. None of these results were seen in laboratory animals exposed to 75 ppm. These studies make no inference nor draw any conclusion regarding human exposure. Exposure to animals has caused some fetotoxic effects at doses that also caused maternal effects. Positive results were obtained in the mouse lymphoma assay.

Oral LD50	Rat	3,500 mg/kg
Dermal LD50	Rabbit	17,800 mg/kg
Inhalation LC50	Rat	4,000 ppm/4-Hours

12. ECOLOGICAL INFORMATION

No data are available on this product.

13. DISPOSAL CONSIDERATIONS

Disposal

When a decision is made to discard this material as supplied, it meets RCRA's characteristic definition of ignitability.

General Statements

Federal regulations may apply to empty container. State and/or local regulations may be different.

General Recommendations

Of the methods of disposal currently available, it is recommended that an alternative be selected according to the following order of preference, based upon environmental acceptability: (1) recycle or rework, if feasible; (2) incinerate at an authorized facility; or (3) treat at an acceptable waste treatment facility.

Special Instructions

Be sure to contact the appropriate government environmental agencies if further guidance is required.



Carbon tetrachloride	56-23-5	< 0.1
Environmental and Special Hazard.		
Non-hazardous trade secret ingredient(s)	Proprietary	Balance

California - California Proposition 65

WARNING: This product contains a chemical(s) known to the State of California to cause cancer and birth defects or other reproductive harm.

Toluene	108-88-3	78.0
Reproductive Hazard.		
Carbon tetrachloride	56-23-5	< 0.1
Cancer Hazard.		
Chloroform	67-66-3	Trace *
Cancer Hazard.		

* Trace = present at less than 0.01 percent.

CONEG

No data available.

Canada

This is a -controlled product- under the Canadian Workplace Hazardous Materials Information System (WHMIS).

Class B Division 2 Class D Division 2 Sub-division A
Class D Division 2 Sub-division B

CEPA - NPRI

Toluene
Xylene
Ethyl benzene

16. OTHER INFORMATION

Hazard Rating		
	HMIS	NFPA
Health	2 *	2
Fire	3	3
Reactivity	0	0

* = Chronic

Product Use

Adhesive

WHMIS Trade Secret Registry Number(s): Thixon 508; WHMIS Trade Secret Registry Number: 3179; Filing date: Jan. 7, 1993; Exemption granted: February 20, 1996.



MATERIAL SAFETY DATA SHEET

Thixon 720
MSDS Number: 2228-1-5
Effective: 2/25/97
Supersedes: 12/17/96

Code: 07200028
Page 1

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Product ID: Thixon 720
Generic Description: Solid curative
Product Use: Curative

For customer service/technical information, contact:
Morton Adhesives & Chemical Specialties
10 South Electric Street
West Alexandria OH 45381
800-348-8846

MSDS prepared by:
Toxicology and Regulated Substance Compliance
David Wienckowski, D.A.B.T.
100 N. Riverside Plaza
Chicago IL 60606
312-807-3422

HAZARD RATINGS table with columns for Health, Fire, Reactivity, HMIS, and NFPA.

Handwritten note: 7-14-99

ChemTrec Emergency
1-800-424-9300

2. COMPOSITION/INFORMATION ON INGREDIENTS

Table with columns: COMPONENT NAME, CAS #, Approximate % (w/w). Row: Aliphatic amine, Proprietary, 100.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: MAY CAUSE ALLERGIC RESPIRATORY REACTION AND SENSITIZATION. MAY CAUSE ALLERGIC SKIN REACTION AND SENSITIZATION. MAY CAUSE RESPIRATORY TRACT IRRITATION. MAY CAUSE DIGESTIVE TRACT IRRITATION. MAY CAUSE EYE IRRITATION. MAY CAUSE SKIN IRRITATION. See sections 3, 5, & 6.

PRIMARY ROUTES OF EXPOSURE: Eye. Skin. Inhalation (breathing).

EYE CONTACT: May cause slight to mild irritation.

SKIN CONTACT: May cause slight to mild irritation. May cause allergic skin reactions and sensitization.

INHALATION (Breathing): Irritating to the eyes, nose, and respiratory tract. May cause allergic respiratory reaction and sensitization.

INGESTION (Swallowing): Irritating to the mouth, throat, and stomach.

TARGET ORGANS/CHRONIC EFFECTS: Lungs and respiratory system. Eyes. Skin. Immune system (e.g, allergic reactions).

CONDITIONS AGGRAVATED BY EXPOSURE: Lungs and respiratory system. Skin. Immune systems and/or specific chemical allergies.

CARCINOGENICITY:



MATERIAL SAFETY DATA SHEET

Thixon 720

MSDS Number: 2228-1-5

Effective: 2/25/97

Supersedes: 12/17/96

Code: 07200028

Page 3

7-14-9

REPORTING: Spills of this material in excess of a component's RQ must be reported to the National Response Center (1-800-424-8802) and to the appropriate state and local emergency response organizations. No regulated ingredients.

7. HANDLING AND STORAGE

Storage Temperature < 140F 60C

STORAGE CONDITIONS: Store in cool, dry, well ventilated area away from heat, ignition sources, and direct sunlight. Keep containers tightly closed.

TRANSFER: No special precautions are needed. Follow good manufacturing and handling practices.

PERSONAL HYGIENE: Wash thoroughly after handling, especially before eating, drinking, smoking, and using restroom facilities. Wash contaminated goggles, faceshield, and gloves. Professionally launder contaminated clothing before re-use.

SPECIAL HANDLING: No special handling required.

EMPTY CONTAINER PRECAUTIONS: Attention! This container can be hazardous when empty. Follow label warnings even after container is emptied since empty containers may retain product residues. Do not reuse empty container without professional cleaning for food, clothing, or products for human or animal consumption or where skin contact can occur.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE GUIDELINES:

ACGIH - TLV - No regulated ingredients.

OSHA - PEL - No regulated ingredients.

ENGINEERING CONTROLS/VENTILATION: Local exhaust ventilation is recommended when vapors, mists, or dusts can be released.

EYE PROTECTION: Wear chemical splash goggles or safety glasses with side shields. An eye wash facility should be readily available.

SKIN PROTECTION: Wear rubber boots and apron, protective clothing, and impervious gloves. Because a variety of protective gloves exist, consult glove manufacturer to determine the proper type for a specific operation. Rubber gloves. An emergency shower should be readily available.

RESPIRATORY PROTECTION: Avoid breathing dust. Wear NIOSH/MSHA-approved equipment. Determine the appropriate type by consulting the respirator manufacturer. High airborne concentrations may necessitate the use of self-contained breathing apparatus (SCBA) or a supplied air respirator. Respiratory protection programs must be in compliance with 29 CFR 1910.134.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance....: White Odor.....: Mild
Physical State: Powder Solubility....: Insoluble
pH.....: Not Applicable Vapor Pressure: Not Determined



MATERIAL SAFETY DATA SHEET

Thixon 720

MSDS Number: 2228-1-5

Effective: 2/25/97

Supersedes: 12/17/96

Code: 07200028

Page 5



7-14-96

Standard (29 CFR 1910.1200).

SARA Title III - Section 311/312 - Hazard Categories:

- N- Fire Hazard
- N- Sudden Release of Pressure Hazard
- N- Reactivity Hazard
- Y- Immediate (acute) Health Hazard
- N- Delayed (chronic) Health Hazard

Ozone-Depleting Chemicals - No regulated ingredients.

SARA Section 302 Extremely Hazardous Mat - No regulated ingredients.

SARA Section 313 Toxic Chemicals - No regulated ingredients.

CHEMICAL LISTING - Listed on the following Country's Chemical Inventories:

United States Toxic Substance Control Act
Chemical component(s) in this product are on the section 8(b) Chemical Substance Inventory List (40 CFR 710).

STATE RIGHT-TO-KNOW:

Pennsylvania - New Jersey R-T-K
Aliphatic amine Proprietary 100

California - California Proposition 65 - No regulated ingredients.

Canada - No data available.

CANADA:
This is a "controlled product" under the Canadian Workplace Hazardous Materials Information System (WHMIS).
Class D Division 2 Sub-division A Class D Division 2 Sub-division B

CEPA - NPRI - No regulated ingredients.

Canadian Chemical Inventory

Domestic Substance List
Listed.

16. OTHER INFORMATION

USERS RESPONSIBILITY: A bulletin such as this cannot be expected to cover all possible individual situations. As the user has the responsibility to provide a safe workplace, all aspects of an individual operation should be examined to determine if, or where, precautions - in addition to those described herein - are required. Any health hazard and safety information herein should be passed on to your customers or employees, as the case may be.

DISCLAIMER OF LIABILITY: The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by use of this material. All chemicals may present unknown health hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards which exist. Final determination of suitability of the chemical

Material Safety Data Sheet

Provided by:

DPC Industries, Inc. DX Distributors, Inc.
DPC Enterprises DX Systems Company
DXI Industries, Inc. DX Terminals

PO Box 24600
Houston, Tx 77229-4600
281-457-4888
888-647-7717
www.dxgroup.com

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name CHLORINE

Synonyms

Chemical Name CHLORINE

Emergency phone: 281-457-4888

Date of Issue: 10/1/00

Chemtrec: 800-424-9300

Revised Date: N/A

SECTION 2 - COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENTS	PERCENT	CAS NO.
CHLORINE	> 99%	7782-50-5

SECTION 3 - HAZARDS IDENTIFICATION

Potential Health Effects

ACGIH - TLV: 0.5 ppm

Eye Contact CONTACT MAY CAUSE EYE BURNS.

Skin Contact CONTACT MAY CAUSE BURNS AND TISSUE DESTRUCTION.

Ingestion NOT A LIKELY ROUTE OF EXPOSURE.

Inhalation COUGHING, BURNING, CHEST PAIN, VOMITING, HEADACHE, ANXIETY AND FEELING OF SUFFOCATION. SEVERE EXPOSURE MAY CAUSE PNEUMONITIS AND PULMONARY EDEMA.

Carcinogenicity: NTP NO IARC NO OSHA NO

SECTION 4 - FIRST AID PROCEDURES

Eye Contact: IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION.

Skin Contact: IMMEDIATELY REMOVE CONTAMINATED CLOTHING OR SHOES, WIPE EXCESS FROM SKIN AND FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. USE SOAP IF AVAILABLE OR FOLLOW BY WASHING WITH SOAP AND WATER. DO NOT REUSE CLOTHING UNTIL THOROUGHLY CLEANED. GET MEDICAL ATTENTION.

Inhalation: REMOVE VICTIM TO FRESH AIR AND PROVIDE OXYGEN IF BREATHING IS DIFFICULT. GIVE ARTIFICIAL RESPIRATION IF NOT BREATHING. GET MEDICAL ATTENTION.

Ingestion: DO NOT INDUCE VOMITING. RINSE MOUTH WITH WATER. IF CONSCIOUS, GIVE LARGE QUANTITIES OF WATER OR MILK AND GET IMMEDIATE MEDICAL ATTENTION. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON!

SECTION 5 - FIRE FIGHTING MEASURES

Flash Point NOT APPLICABLE

Extinguishing Media USE MEDIA FOR SURROUNDING MATERIALS.

**Special Firefighting
Procedures/Precuations**

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE GEAR. USE WATER TO COOL CONTAINERS BUT AVOID GETTING WATER INTO CONTAINERS.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

For Spill:

EVACUATE UNNECESSARY PERSONNEL UPWIND OF SPILL AREA. CONTAIN LIQUIDS AND PREVENT DISCHARGES INTO WATERWAYS AND SEWERS. CONTROL OR STOP THE LOSS OF VOLATILE MATERIAL TO THE ATMOSPHERE. DO NOT APPLY WATER TO THE LEAK. CHLORINE CAN BE ABSORBED INTO AN ALKALI.

SECTION 7 - HANDLING AND STORAGE

Keep container tightly closed when not in use. Store in a cool, dry, well-ventilated area, away from heat and incompatible materials. Protect containers from physical damage.

FOLLOW SAFETY PROCEDURES FOR CONTAINERS OF COMPRESSED GASES. PROVIDE SPECIAL TRAINING TO WORKERS HANDLING CHLORINE. STORE IN WELL-VENTILATED AREA OF LOW FIRE POTENTIAL AND AWAY FROM INCOMPATIBLE MATERIALS. REGULARLY TEST AND INSPECT PIPING AND CONTAINMENT. HEATING COULD MELT PLUGS ON CYLINDERS AND TOP CONTAINERS AND CAUSE SAFETY VALVES ON TANK CARS TO VENT, CAUSING LEAKS. MOISTURE (MORE THAN 150 PPM OF WATER) AND CHLORINE CAN FORM HYDROCHLORIC AND HYPOCHLOROUS ACIDS, WHICH ARE CORROSIVE. NEVER PLACE A LEAKING CONTAINER IN WATER OR SPRAY LEAKING CONTAINER WITH WATER. NEVER TAMPER WITH FUSIBLE PLUGS OR SAFETY DEVICES ON CONTAINERS; NEVER MANIFOLD CONTAINERS FROM LIQUID VALVES. THIS PRODUCT IS TOXIC TO FISH. KEEP OUT OF WATERWAYS AND SEWERS.

SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

Respiratory Protection

USE A NIOSH/MSHA APPROVED RESPIRATOR FOLLOWING MANUFACTURER'S RECOMMENDATIONS WHEN CONCENTRATIONS EXCEED PERMISSIBLE EXPOSURE LIMITS.

Ventilation

LOCAL AND MECHANICAL RECOMMENDED.

Protective Gloves

CHEMICAL IMPERVIOUS GLOVES.

Eye/Face Protection

CHEMICAL SAFETY GOGGLES AND/OR FULL-FACE SHIELD.

Other Protection

CHEMICAL RESISTANT CLOTHING SUCH AS COVERALLS/APRON, BOOTS, ETC. EMERGENCY SHOWER AND EYEWASH FACILITY SHOULD BE IN CLOSE PROXIMITY.

Work Practices

USE GOOD PERSONAL HYGIENE PRACTICES. WASH HANDS BEFORE EATING, DRINKING, SMOKING, OR USING TOILET FACILITIES. PROMPTLY REMOVE SOILED CLOTHING AND WASH THOROUGHLY BEFORE REUSE. SHOWER AFTER WORK USING PLENTY OF SOAP AND WATER.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point (°F): -29.3	Vapor Pressure (mmHg): 2748 (@ 20 C)
Freezing Point (°F): -150	Vapor Density (Air=1): 2.49
Solubility (H2O): NEGLIGIBLE	Specific Gravity (H2O=1): 1.4
pH 5.5	Evaporation Rate: NOT APPLICABLE.
Appearance/Odor: AMBER COLOR LIQUID. GREENISH-YELLOW GAS. PUNGENT IRRITATING ODOR.	

SECTION 10 - STABILITY AND REACTIVITY

Chemical Stability:

YES

Incompatible Materials

AVOID CONTACT WITH REDUCING AGENTS. KEEP AWAY FROM MATERIALS SUCH AS ACETYLENE, TURPENTINE & OTHER HYDROCARBONS, AMMONIA, HYDROGEN, ETHER, METALS, SULFUR, & ALUMINUM.

Decomposition Products

REACTS WITH HYDROGEN SULFIDE AND WATER FORMING HYDROCHLORIC ACID. COMBINES WITH CARBON MONOXIDE AND SULFUR DIOXIDE FORMING PHOSGENE AND SULFURYL CHLORIDE.

Hazardous Polymerization:

WILL NOT OCCUR.

SECTION 11 - TOXICITY INFORMATION

LC50 (rr,t) = 293 ppm

SECTION 12 - ECOLOGICAL INFORMATION

LC50/96HR/RAINBOW TROUT/14-291 UG/LLC50/96HR/STRIPED BASS/140-230 UG/LLC50/48HR/WATER FLEA/30-150 UG/LI.OEC PGR/5-10 DAY/GREEN ALGAE/760-1520 UG/L

SECTION 13 - DISPOSAL CONSIDERATIONS

DISPOSE OF WASTE MATERIALS ACCORDING TO ALL FEDERAL, STATE AND LOCAL REGULATIONS

SECTION 14 - TRANSPORT INFORMATION

USA DOT Shipping Name: CHLORINE

Hazard Class: 2.3 (POISON-INHALATION HAZARD, ZONE B)

UN/NA Number: UN1017

Packing Group: NOT APPLICABLE

Subsidiary Hazard: CORROSIVE

Marine Pollutant: YES

SECTION 15 - REGULATORY INFORMATION

CERCLA RQ (lbs): 10

SARA Title III Section 312:

Acute Chronic Flammable Sudden Release of Pressure Reactive

SARA Title III Section 313: Yes

SARA Extremely Hazardous Substance: Yes

HMIS HAZARD RATING

Health: 4 **Fire:** 0 **Reactivity:** 0
0 - Least 1 - Slight 2 - Moderate 3 - High 4 - Extreme

SECTION 16 - OTHER INFORMATION

EPA Pesticide Registration Number: 813-10

NSF Maximum Use Level for Potable Water (Standard 60): 30 mg/l

TSCA (Toxic Substance Control Act), 40 CFR 710:

Sources of the raw materials used in this mixture assure that all chemical ingredients present are in compliance with Section 8(b) Chemical Substance Inventory, or are otherwise in compliance with TSCA.

DISCLAIMER

THE DATA PRESENTED IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF; HOWEVER, NEITHER SELLER NOR PREPARER MAKES ANY WARRANTIES, EXPRESSED OR IMPLIED, CONCERNING THE INFORMATION PRESENTED. THE USER IS CAUTIONED TO PERFORM HIS OWN HAZARD EVALUATION AND TO RELY UPON HIS OWN DETERMINATIONS.

MATERIAL SAFETY DATA SHEET

M.S. NUMBER: M4734

MSDS DATE: 04-04-86

PRODUCT NAME: LIQUID CHLORINE

24 HOUR EMERGENCY PHONE: (214) 922-2700



**Diamond Shamrock
Chemicals Company**

I. PRODUCT IDENTIFICATION

Dixie Chemical
467-4800

3 HEALTH HAZARD, 0 FIRE HAZARD, & 0 REACTIVITY rating based on NIOSH "Identification System for Occupationally Hazardous Materials" (1974)

MANUFACTURER'S NAME AND ADDRESS: Diamond Shamrock Chemicals Company,
Chlor-Alkali Division, 351 Phelps Court, P.O. Box 152300, Irving,
Texas 75015-2300

CHEMICAL NAME: Chlorine

CAS NUMBER: 7782-50-5

SYNONYMS/Common Names: Chlorine Gas

CHEMICAL FORMULA: Cl₂

DOT PROPER SHIPPING NAME: Chlorine

DOT HAZARD CLASS: Nonflammable gas (poison B)

DOT I.D. NUMBER: UN1017

HAZARDOUS SUBSTANCE: RQ-10

HAZARDOUS INGREDIENTS

SERIAL OR COMPONENT	HAZARD DATA	CAS NUMBER	%
Chlorine	PEL = 1 ppm Ceiling TLV = 1 ppm 8 hr. TWA Value from the 1969 ACGIH-TLV did not indicate a ceiling (See Section V)	7782-50-5	100

This material is listed in the TSCA Inventory
Not listed as carcinogenic by IARC, NTP, OSHA, ACGIH

III. PHYSICAL DATA

BOILING POINT @ 760 mm Hg: -34°C (-29.3°F)

FREEZING POINT: -101°C (-150°F)

VAPOR DENSITY (Air=1): 2.5

VAPOR PRESSURE: 2748mm Hg @ 0°C

SPECIFIC GRAVITY (H₂O=1): 1.4 @ 15.4°C

SOLUBILITY IN H₂O % BY WT: 0.7 % @ 20°C

% VOLATILES BY VOL.: 100

APPEARANCE AND ODOR: Amber color liquid. Greenish-yellow gas.
Pungent irritating odor.

0.7% solution has pH 5.5

Chemical Abstract Service Number
OSHA Permissible Exposure Limit
TLV = TLV, ACGIH Threshold Limit Value, Current

N/A = No relevant information found or not available
NA = Not applicable

Diamond Shamrock Chemicals Company - A subsidiary of Diamond Shamrock Corporation

This Material Safety Data Sheet was prepared in accordance with 29 CFR 1910.1200. All information, recommendations and suggestions appearing herein concerning our product are based upon tests and data believed to be reliable. However, it is the user's responsibility to determine the safety, toxicity and suitability for his own use of the product described herein. Since the actual use by others is beyond our control, no guarantee expressed or implied is made by Diamond Shamrock as to the effects of such use the results to be obtained or the safety and toxicity of the product nor does Diamond Shamrock assume any liability arising out of use by others of the product referred to herein. Nor is the information herein to be construed as absolutely complete since additional information may be necessary or desirable when particular or exceptional conditions or circumstances

toxicity and suitability for his own use of the product described herein. Since the actual use by others is beyond our control, no guarantee expressed or implied is made by Diamond Shamrock as to the effects of such use the results to be obtained or the safety and toxicity of the product nor does Diamond Shamrock assume any liability arising out of use by others of the product referred to herein. Nor is the information herein to be construed as absolutely complete since additional information may be necessary or desirable when particular or exceptional conditions or circumstances

VI. REACTIVITY DATA

CONDITIONS CONTRIBUTING TO INSTABILITY:

Chlorine is stable. Avoid the release of chlorine to the atmosphere. Do not place chlorine containers near heat or fire. Never use water on the source of a chlorine leak. Water spray may be used to direct the flow of escaping chlorine gas.

INCOMPATIBILITY:

Moist chlorine is highly corrosive to most metals. Chlorine reaction to some organic compounds can be explosive.

HAZARDOUS DECOMPOSITION PRODUCTS:

None.

CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION:

None.

VII. ENVIRONMENTAL PROCEDURES

NEUTRALIZING CHEMICALS:

Chlorine can be absorbed into an alkaline solution, i.e., caustic soda (NaOH), caustic potash (KOH), lime, etc.

WASTE DISPOSAL METHOD:

Dispose in accordance with all federal, state, and local health and pollution regulations. Depending upon the particular situation involved, special equipment may be required. Consult your chlorine supplier.

SPILLS OR RELEASES:

If a material is spilled or released to the atmosphere, steps should be taken to contain liquids and prevent discharges to streams or sewer systems; and control or stop the loss of volatile materials to the atmosphere. Spills or releases should be reported, if required, to the appropriate local, state and federal regulatory agencies.

DISPOSAL OR STORAGE:

Clean-up action should be carefully planned and executed. Shipment, storage, and/or disposal of waste materials are regulated and action to handle spilled or released materials must meet the applicable rules. If any question exists, the appropriate agencies should be contacted to assure proper action being taken.

VIII. INDUSTRIAL HYGIENE CONTROL MEASURES

VENTILATION REQUIREMENTS:

Where engineering controls are not feasible, use local exhaust ventilation where gas leaks may occur.

SPECIFIC PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY:

Use a NIOSH/MSHA approved respirator following manufacturer's recommendations where gas leaks may occur. Use supplied air respirator in positive pressure mode following ANSI Z117.1-1977 for tank and confined space entry.

EYE:

Face shields and goggles or chemical goggles should be worn.

HANDS:

Impervious gloves should be worn. Natural rubber or latex have been used. Contaminated gloves should be discarded.

OTHER CLOTHING AND EQUIPMENT:

Standard work clothing. Wash contaminated clothing with soap and water and dry before reuse. Shower and eyewash facilities should be accessible.



INORGANIC COATINGS, INC.

500 Lapp Road
Malvern, PA 19355

EMERGENCY PHONE NO. 215-640-2880

INFORMATION PHONE NO. 215-640-2880

610

FOR TRANSPORTATION EMERGENCY

CONTACT:

CHEM-TEL INC. 1-800-255-3924

MATERIAL SAFETY DATA SHEET

SECTION I - IDENTIFICATION

TRADE NAME: ~~Methyl~~ Ethyl Ketone
MANUFACTURER CODE I.D.: MEK

DATE OF PREPARATION: 4/1/85

SECTION II - HAZARDOUS INGREDIENTS

INGREDIENT	% by VOL	TLV
Methyl Ethyl Ketone CAS #78-93-3	100%	200 ppm

SECTION III - HEALTH INFORMATION

EFFECTS OF SHORT TERM OVEREXPOSURE

INHALATION

Concentrations of 100-300 ppm cause nose and throat irritation. Higher concentrations cause more severe irritation, headache, nausea, drowsiness, dizziness, and incoordination.

EYE

Liquid causes severe irritation. Vapors cause slight to moderate irritation, depending on the concentration.

SKIN

Prolonged exposure to liquid or to vapors at concentrations greater than the TLV cause moderate irritation.

SWALLOWING

Moderately toxic; may cause nausea, vomiting, and diarrhea.

EFFECTS OF REPEATED OVEREXPOSURE

Long-term repeated exposures to high concentrations of vapor may result in central nervous system depression and narcosis.

SECTION IV - FIRST AID AND EMERGENCY PROCEDURES

SWALLOWING

If swallowed, do not induce vomiting, keep person warm, quiet, and get medical attention.

INHALATION

If affected, remove individual to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Keep person warm, quiet and get medical attention.

EYE

Flush immediately with large amounts of water for 15 minutes. Get medical attention.

SKIN CONTACT

Remove contaminated clothing and flush skin with water.

NOTES TO PHYSICIAN: Aspirated methyl ethyl ketone may cause severe lung damage and present a significant hazard. Stomach contents should be evacuated quickly in a manner which avoids aspiration. Otherwise, treatment is directed at the control of symptoms and clinical condition. There is no specific antidote.

RESPIRATORY PROTECTION

Self-contained breathing apparatus in high concentrations.

VENTILATION

This product should be confined within closed equipment, in which case general (mechanical) room ventilation should be satisfactory. Special, local ventilation is needed at points where vapors can be expected to escape to the workplace air.

HAZARD PROTECTION

Wear protective gloves (consult your safety equipment supplier).

EYE PROTECTION

Wear safety monogoggles (consult your safety equipment supplier).

OTHER PROTECTIVE EQUIPMENT

Eye bath, safety shower.

SECTION X - SPECIAL PRECAUTIONS**PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE**

Keep away from heat, sparks, and flame. Avoid breathing vapor. Avoid contact with eyes, skin, and clothing. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling.

SECTION XI - OTHER INFORMATION**US DOT INFORMATION**

HAZARD CLASS: FLAMMABLE LIQUID

ID NUMBER: UN 1263

PROPER SHIPPING NAME: Methyl Ethyl Ketone

The information contained herein is based on data considered to be accurate. While the information is believed to be reliable, no warranty is expressed or implied regarding the accuracy of this data or the results to be obtained from the use thereof. Since the use of this information and the conditions and use of this product are controlled by the user, it is the user's obligation to determine the conditions of safe use of the product.

STARTEX CHEMICAL, INC.
P.O. BOX 3087
CONROE, TEXAS 77305
(409) 539-6244

MATERIAL SAFETY DATA SHEET
24 Hour Emergency Telephone Number - CHEMTREC 1-800-424-9300
THIS MSDS COMPLIES WITH 29 CFR 1910.1200
(THE HAZARD COMMUNICATION STANDARD)

-----SECTION I - PRODUCT IDENTIFICATION-----

PRODUCT NAME: SC-20
GENERIC ID: KETONE
DOT HAZARD CLASSIFICATION: 3 (FLAMMABLE LIQUID)
DATE PREPARED: 10/16/96

-----SECTION II - COMPONENTS-----

NO.	COMPOSITION	CAS NUMBER	PERCENT
P	KETONE	78-93-3	100

NFPA HAZARD RATING: HEALTH 1 FIRE 3 REACTIVITY 0

ACUTE TOXICITY DATA

NO.	ACUTE ORAL LD50	ACUTE DERMAL LD50	ACUTE INHALATION LC50
P	2.9 G/KG (RAT)	5 G/KG (RABBIT)	5000 PPM/8H (RAT)

-----SECTION III - PHYSICAL DATA-----

BOILING POINT: 175 (DEG F) SPECIFIC GRAVITY: 0.81 (H2O=1) VAPOR PRESSURE: 70.9 @ 68 DEG. F (MM HG)
MELTING POINT: -124 (DEG F) SOLUBILITY: APPRECIABLE (IN WATER) VAPOR DENSITY: 2.5 (AIR=1)
EVAPORATION RATE (N-BUTYL ACETATE = 1): 3.8 VOC: 100% 6.67 LB/GL

APPEARANCE AND ODOR:
COLORLESS, MOBILE LIQUID, PUNGENT ODOR.

-----SECTION IV - FIRE AND EXPLOSION INFORMATION-----

FLASH POINT AND METHOD: 23 DEG. F (TCC) FLAMMABLE LIMITS % VOLUME IN AIR
LOWER: 1.8 UPPER: 11.5

EXTINGUISHING MEDIA
USE WATER FOG, "ALCOHOL" FOAM, DRY CHEMICAL OR CO2.

SPECIAL FIRE FIGHTING PROCEDURES AND PRECAUTIONS
WARNING: FLAMMABLE. CLEAR FIRE AREA OF UNPROTECTED PERSONNEL. DO NOT ENTER CONFINED FIRE SPACE WITHOUT FULL BUNKER GEAR (HELMET WITH FACE SHIELD, BUNKER COATS, GLOVES AND RUBBER BOOTS), INCLUDING A POSITIVE PRESSURE NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER.

UNUSUAL FIRE AND EXPLOSION HAZARDS
CONTAINERS EXPOSED TO INTENSE HEAT FROM FIRES SHOULD BE COOLED WITH WATER TO PREVENT VAPOR PRESSURE BUILDUP WHICH COULD RESULT IN CONTAINER RUPTURE. CONTAINER AREAS EXPOSED TO DIRECT FLAME CONTACT SHOULD BE COOLED WITH LARGE QUANTITIES OF WATER AS NEEDED TO PREVENT WEAKENING OF CONTAINER STRUCTURE.

-----SECTION V - HEALTH AND HAZARD DATA-----

EYE CONTACT
IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION.

SKIN CONTACT
FLUSH SKIN WITH WATER WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. IF IRRITATION OCCURS, GET MEDICAL ATTENTION. DO NOT REUSE CLOTHING OR SHOES UNTIL CLEANED.

INHALATION
REMOVE VICTIM TO FRESH AIR AND PROVIDE OXYGEN IF BREATHING IS DIFFICULT. GIVE ARTIFICIAL RESPIRATION IF NOT BREATHING. GET MEDICAL ATTENTION.

INGESTION
DO NOT GIVE LIQUIDS IF VICTIM IS UNCONSCIOUS OR DROWSY. OTHERWISE GIVE NO MORE THAN 2 GLASSES OF WATER AND INDUCE VOMITING BY GIVING 30CC (2 TABLESPOONS) SYRUP OF IPECAC. IF IPECAC IS UNAVAILABLE, GIVE 2 GLASSES OF WATER AND INDUCE VOMITING BY TOUCHING FINGER TO BACK OF VICTIM'S THROAT. KEEP VICTIM'S HEAD BELOW HIPS WHILE VOMITING. GET MEDICAL ATTENTION.

NOTE TO PHYSICIAN
*IF VICTIM IS A CHILD, GIVE NO MORE THAN 1 GLASS OF WATER AND 15CC (1 TABLESPOON) SYRUP OF IPECAC. IF SYMPTOMS SUCH AS A LOSS OF GAG REFLEX, CONVULSIONS OR UNCONSCIOUSNESS OCCUR BEFORE EMESIS, GASTRIC LAVAGE SHOULD BE CONSIDERED FOLLOWING INTUBATION WITH A CUFFED ENDOTRACHEAL TUBE.

THE HEALTH EFFECTS NOTED BELOW ARE CONSISTENT WITH REQUIREMENTS UNDER THE OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200).

EYE CONTACT
LIQUID IS MILDLY IRRITATING TO THE EYES. HIGH VAPOR CONCENTRATIONS MAY ALSO BE IRRITATING.

SKIN CONTACT
LIQUID IS MODERATELY IRRITATING TO THE SKIN. PROLONGED OR REPEATED LIQUID CONTACT CAN RESULT IN DEFATTING AND DRYING OF THE SKIN WHICH MAY RESULT IN SKIN IRRITATION AND DERMATITIS.

INHALATION
VAPORS MAY CAUSE IRRITATION TO NOSE, THROAT AND RESPIRATORY TRACT. HIGH VAPOR CONCENTRATIONS MAY CAUSE CNS DEPRESSION.

INGESTION
LIQUID IS MODERATELY TOXIC AND MAY BE HARMFUL IF SWALLOWED; MAY PRODUCE CNS DEPRESSION.

SIGNS AND SYMPTOMS
IRRITATION AS NOTED ABOVE. EARLY TO MODERATE CNS (CENTRAL NERVOUS SYSTEM) DEPRESSION MAY BE EVIDENCED BY GIDDINESS, HEADACHE, DIZZINESS AND NAUSEA; IN EXTREME CASES, UNCONSCIOUSNESS AND DEATH MAY OCCUR.

AGGRAVATED MEDICAL CONDITIONS
PREEXISTING EYE, SKIN, AND RESPIRATORY DISORDERS MAY BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT.

IN PREGNANT FEMALE RODENTS EXPOSED BY INHALATION TO HIGH CONCENTRATIONS OF METHYL ETHYL KETONE (MEK) VAPOR (15X THE OSHA PEL/TWA) MINOR DEVELOPMENTALLY TOXIC EFFECTS TO THE FETUSES WERE OBSERVED.

MEK HAS BEEN DEMONSTRATED TO POTENTIATE (I.E. SHORTEN THE TIME OF ONSET) THE PERIPHERAL NEUROPATHY CAUSED BY EITHER N-HEXANE OR METHYL N-BUTYL KETONE. MEK BY ITSELF HAS NOT BEEN DEMONSTRATED TO CAUSE PERIPHERAL NEUROPATHY.

MEK CAN POTENTIATE THE NEUROTOXICITY OF HEXACARBON COMPOUNDS (N-HEXANE, METHYL-N-BUTYLKETONE, AND 2, 5-HEXANEDIONE) AND THE LIVER AND KIDNEY TOXICITY OF HALOALKANE SOLVENTS.

-----SECTION VI-REACTIVITY DATA-----

STABILITY: STABLE

CONDITIONS AND MATERIALS TO AVOID:
AVOID HEAT, SPARKS, FLAME AND CONTACT WITH STRONG OXIDIZING AGENT.

HAZARDOUS DECOMPOSITION PRODUCTS
CARBON MONOXIDE AND UNIDENTIFIED ORGANIC COMPOUNDS MAY BE FORMED DURING COMBUSTION. ONE HAZARDOUS COMBUSTION PRODUCT, METHYL VINYL KETONE HAS BEEN FOUND IN THE COMBUSTION ZONE OF A PLANT INCINERATOR BURNING WASTE MEK. THIS INFORMATION WAS SUPPLIED TO EPA UNDER FY# OTS-0189-0661 BY HERCULES, INC.

-----SECTION VII-SPILL OR LEAK PROCEDURES-----

SPILL OR LEAK PROCEDURES
WARNING: FLAMMABLE. ELIMINATE ALL IGNITION SOURCES. HANDLING EQUIPMENT MUST BE GROUNDED TO PREVENT SPARKING. ***LARGE SPILLS*** EVACUATE THE HAZARD AREA OF UNPROTECTED PERSONNEL. WEAR APPROPRIATE RESPIRATOR AND PROTECTIVE CLOTHING. SHUT OFF SOURCE OF LEAK ONLY IF SAFE TO DO SO. DIKE AND CONTAIN IF VAPOR CLOUD FORMS. WATER FOG MAY BE USED TO SUPPRESS. CONTAIN RUN-OFF REMOVE WITH VACUUM TRUCKS OR PUMP TO STORAGE/SALVAGE VESSELS. SOAK UP RESIDUE WITH AN ABSORBENT SUCH AS CLAY. RAMP OR OTHER SUITABLE MATERIAL. PLACE IN NON-LEAKING CONTAINERS FOR PROPER DISPOSAL. FLUSH AREA WITH WATER TO REMOVE TRACE QUANTITIES OF FLUSH SOLUTIONS AS ABOVE. ***SMALL SPILLS*** TAKE UP WITH AN ABSORBENT MATERIAL AND PLACE IN NON-LEAKING CONTAINERS. SLA-TIGHTLY FOR PROPER DISPOSAL.

-----SECTION VIII-PROTECTIVE EQUIPMENT TO BE USED-----

RESPIRATORY PROTECTION
AVOID PROLONGED OR REPEATED BREATHING OF VAPORS. IF EXPOSURE MAY OR DOES EXCEED OCCUPATIONAL EXPOSURE LIMITS (SEC. IV) USE A NIOSH-APPROVED RESPIRATOR TO PREVENT OVEREXPOSURE. IN ACCORD WITH 29 CFR 1910.134 USE EITHER A FULL-FACE, ATMOSPHERE-SUPPLYING RESPIRATOR OR AN AIR-PURIFYING RESPIRATOR FOR ORGANIC VAPORS.

PROTECTIVE CLOTHING
AVOID CONTACT WITH EYES. WEAR CHEMICAL GOGGLES IF THERE IS LIKELIHOOD OF CONTACT WITH EYES. AVOID PROLONGED OR REPEATED CONTACT WITH SKIN. WEAR CHEMICAL-RESISTANT GLOVES AND OTHER CLOTHING AS REQUIRED TO MINIMIZE CONTACT. TEST DATA FROM PUBLISHED LITERATURE AND/OR GLOVE AND CLOTHING*

ADDITIONAL PROTECTIVE MEASURES
MANUFACTURERS INDICATE THE BEST PROTECTION IS PROVIDED BY BUTYL. USE EXPLOSION-PROOF VENTILATION AS REQUIRED TO CONTROL VAPOR CONCENTRATIONS. AIR-DRY CONTAMINATED CLOTHING IN A WELL VENTILATED AREA, THEN LAUNDRER BEFORE REUSING.

-----SECTION IX-SPECIAL PRECAUTIONS OR OTHER COMMENTS-----

KEEP LIQUID AND VAPOR AWAY FROM HEAT, SPARKS OR FLAME. EXTINGUISH PILOT LIGHTS, CIGARETTES AND TURN OFF OTHER SOURCES OF IGNITION PRIOR TO USE AND UNTIL ALL VAPORS ARE GONE. VAPORS MAY ACCUMULATE AND TRAVEL TO IGNITION SOURCES DISTANT FROM THE HANDLING SITE; FLASH-FIRE CAN RESULT. KEEP CONTAINERS CLOSED WHEN NOT IN USE. USE WITH ADEQUATE VENTILATION.

CONTAINERS, EVEN THOSE THAT HAVE BEEN EMPTIED, CAN CONTAIN EXPLOSIVE VAPORS. DO NOT CUT, DRILL, GRIND, WELD OR PERFORM SIMILAR OPERATIONS ON OR NEAR CONTAINERS. DO NOT PRESSURIZE DRUM CONTAINERS TO EMPTY THEM.

STATIC ELECTRICITY MAY ACCUMULATE AND CREATE A FIRE HAZARD. GROUND FIXED EQUIPMENT. BOND AND GROUND TRANSFER CONTAINERS AND EQUIPMENT.

WASH WITH SOAP AND WATER BEFORE EATING, DRINKING, SMOKING, APPLYING COSMETICS, OR USING TOILET FACILITIES. LAUNDRER CONTAMINATED CLOTHING BEFORE REUSE. AIR-DRY CONTAMINATED CLOTHING IN A WELL VENTILATED AREA BEFORE LAUNDRING.

TRANSPORTATION REQUIREMENTS

DEPARTMENT OF TRANSPORTATION CLASSIFICATION:
CLASS 3, FLAMMABLE LIQUID, II

D.O.T. PROPER SHIPPING NAME:
METHYL ETHYL KETONE (OR ETHYL METHYL KETONE)

OTHER REQUIREMENTS:
UN1193, GUIDE 26

THIS PRODUCT IS LISTED ON THE EPA/TSCA INVENTORY OF CHEMICAL SUBSTANCES

PROTECTION OF STRATOSPHERIC OZONE (PURSUANT TO SECTION 611 OF THE CLEAN AIR ACT AMENDMENTS OF 1990): PER 40 CFR PART 8, THIS PRODUCT DOES NOT CONTAIN NOR WAS IT DIRECTLY MANUFACTURED WITH ANY CLASS I OR CLASS II OZONE DEPLETING SUBSTANCES.

IN ACCORDANCE WITH SARA TITLE III, SECTION 313, THE ENVIRONMENTAL DATA SHEET (EDS) SHOULD ALWAYS BE COPIED AND SENT WITH THE MSDS.

CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED. SINCE EMPTIED CONTAINERS RETAIN PRODUCT RESIDUES (VAPOR, LIQUID, AND/OR SOLID), ALL HAZARD PRECAUTIONS GIVEN IN THE DATA SHEET MUST BE OBSERVED.

WARNING!!! SUDDEN RELEASE OF HOT ORGANIC CHEMICAL VAPORS OR MISTS FROM PROCESS EQUIPMENT OPERATING AT ELEVATED TEMPERATURE AND PRESSURE, OR SUDDEN INGRESS OF AIR INTO VACUUM EQUIPMENT, MAY RESULT IN IGNITIONS WITHOUT THE PRESENCE OF OBVIOUS IGNITION SOURCES. PUBLISHED "AUTOIGNITION" OR "IGNITION" TEMPERATURE VALUES CANNOT BE TREATED AS SAFE OPERATING TEMPERATURES IN CHEMICAL PROCESSES WITHOUT ANALYSIS OF THE ACTUAL PROCESS CONDITIONS. ANY USE OF THIS PRODUCT IN ELEVATED TEMPERATURE PROCESSES SHOULD BE THOROUGHLY EVALUATED TO ESTABLISH AND MAINTAIN SAFE OPERATING CONDITIONS.

-----DISCLAIMER-----

THE INFORMATION, RECOMMENDATIONS AND SUGGESTION HEREIN WERE COMPILED FROM REFERENCE MATERIAL AND OTHER SOURCES BELIEVED TO BE RELIABLE. HOWEVER, THE MSDS'S ACCURACY OR COMPLETENESS IS NOT GUARANTEED BY THIS COMPANY, NOR IS ANY RESPONSIBILITY ASSUMED OR IMPLIED FOR ANY LOSS OR DAMAGE RESULTING FROM INACCURACIES OR OMISSIONS. SINCE CONDITIONS OF USE ARE BEYOND OUR CONTROL, NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSED OR IMPLIED.

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APPROPRIATE WARNINGS AND SAFE HANDLING PROCEDURES SHOULD BE PROVIDED TO HANDLERS AND USERS.
END



section 1 - Preparation / Product Information

manufactured for and supplied by: Harwick Standard Distribution Corporation
60 South Seiberling Street
P.O. Box 9360
Akron, OH 44305-0360

telephone no: (330) 798-9300

date prepared: August 3, 2001

preparer: Health, Safety & Environment

product use: Plasticizer

section 2 - Ingredients / Identity Information

components chemical identity/cas#	exposure limits			Toxicity LD50/LC50	amount %
	PEL	TLV	OTHER		
Di (2-ethylehexyl) phthalate (DEHP) CAS #117-81-7	5mg/m ³	5mg/m ³	10mg/m ³ STEL	LD50 rat/oral 30,500 mg/kg	90-100

section 3 - Physical / Chemical Characteristics

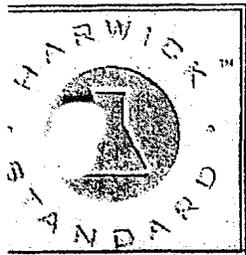
boiling point:	447°F (231°C)	specific gravity:	0.98 @ 20°C
freezing point:	-58°F (-50°C)	pH:	Not Determined
vapor pressure (mm Hg):	8mm of Hg @ 20°C	odor threshold (ppm):	Not Determined
vapor density (AIR=1):	13.5	coef. water/oil dist.:	Not Determined
solubility in water:	Not Determined	evaporation rate:	Negligible
appearance (physical state) and odor:		Liquid; Clear Oily Odor; Slight	

section 4 - Fire and Explosion Hazard Data

flash point (method): 420°F (216°C) (COC)

extinguishing media: Dry Chemical, CO₂, foam, water fog. Water & foam may cause frothing when they com in contact with the burning material.

The information and recommendations contained herein are based upon data that are believed to be accurate and reliable. Application and performance information are provided only as a guide, since the conditions of use are beyond the control of Harwick Standard Distribution Corporation. Consequently, Harwick Standard makes no warranties, express or implied, with respect to the goods or use of the goods or performance of the goods and makes no warranties of fitness for a particular purpose or merchantability. Buyer acknowledges that Harwick Standard will not be liable for consequential, incidental, direct or special damages arising, directly or indirectly, in respect to such goods or the use or failure thereof, whether based on breach of warranty, negligence, strict liability in tort or otherwise.



Special fire fighting procedures: Wear self-contained breathing apparatus and protective clothing. Use water to keep fire exposed containers cool.

Unusual fire and explosion hazards: None

Hazardous combustion products: CO_x

Hazardous decomposition or byproducts: CO_x, organic acids

Section 5 - Reactivity Data

Stability:
stable:
unstable:

Conditions to avoid (cond. of reactivity): None known

Incompatibility (materials to avoid): Strong oxidizers

Hazardous decomposition or byproducts: CO_x, organic acids

Hazardous polymerization:
may occur:
will not occur:

Conditions to avoid: None known

Hazardous polymerization: 0

Section 6 - Health Hazard Data

Primary routes of exposure

Inhalation: **Skin contact:** **Eye contact:**
Skin absorption: **Ingestion:**

Health hazards

Acute: Eye contact may cause an irritation. Ingestion may be dangerous to your health. Inhalation may cause irritation to the respiratory tract.

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chronic: A report has shown an increase of tumors in the liver of rats and mice following a high daily ingestion of DOP over 2 years. However, there is no indication of chronic danger to human health based on 40 years of use. DOP is not genotoxic, its evaporation rate is very low and is not easily absorbed by the skin. Consequently, it presents a negligible risk to humans at typical exposure levels of industrial and general public uses.

carcinogenicity

NTP Anticipated human **IARC** possible human **OSHA**

Di(2-ethylhexyl)phthalate causes gastrointestinal effects in man. It is a mild eye and skin irritant. Although it causes liver cancer in rodents, the significance of this response to humans is not known. Reproductive and developmental effects have been observed in rodents fed high doses. However, experts from the EEC Commission have concluded that it could not be classified as a carcinogen or as a teratogenic substance. Di(2-ethylhexyl) phthalate is an NTP anticipated human carcinogen and an IARC possible human carcinogen.

signs and symptoms of exposure: See Health Hazards above.

medical conditions generally aggravated by exposure: None known

hazard rating: 1*

section 7 - First Aid Measures

emergency and first aid procedures

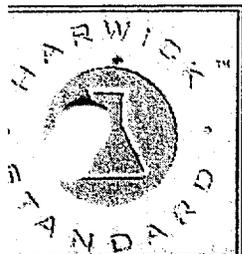
inhalation: Move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Consult a physician.

ingestion: Do not induce vomiting. Consult a physician.

skin contact: Wash with soap and water. If irritation develops, consult a physician.

eye contact: Flush with water for 15 minutes. If irritation develops, consult a physician.

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Section 8 – Precautions for Safe Handling and Use

Steps to be taken in case material is released or spilled: Absorb spill with vermiculite or other inert material, then place in a container for chemical waste.

waste disposal method: In accordance with federal, state, and local regulations. Refer to section 10.

Precautions to be taken in handling and storing: Avoid breathing mist and vapor at concentrations greater than the exposure limits. Keep container closed. Use only with adequate ventilation. Keep contact with oxidizing materials. Wash thoroughly after handling. The product can support combustion, therefore it should be kept in a cool, dry place away from potential ignition sources.

Other precautions: Avoid contact with eyes, skin, and clothing.

Section 9 – Control Measures

Respiratory protection (specify type): A NIOSH/MSHA approved respirator above PEL or TLV or as necessary for organic mists and vapors.

Ventilation

Local exhaust: Recommended to minimize exposure.
mechanical (general): Recommended to minimize exposure.

Protective gloves: Impervious

Eye protection: Chemical goggles

Other protective clothing or equipment: Eyewash station and safety shower

Work/hygienic practices: Wash thoroughly after handling

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PRODUCT CODES: 4729, 4730, 4731, 4732, 4733, 4734, 4735, 4736, 4737, 4744, 4745, 4748, 4751, 4752, 4753, 4754, 4755, 4756, 4757, 4758, 4818, 4820, 4733, 4618

MATERIAL SAFETY DATA SHEET

SULFUR: SOLID, GRANULAR OR GROUND

EMERGENCY ASSISTANCE

S.F. SULFUR CORPORATION: (912) 244-0000
PREPARED: February 1, 1996

For use only in case of emergencies involving a spill, leak, fire, exposure or accident.

CHEMTREC: (800) 424-9300

HAZARD RATING

LEAST - 0 SLIGHT - 1 MODERATE - 2 HIGH - 3 EXTREME - 4

ACUTE HEALTH - 1
FIRE - 1
REACTIVITY - 0

SECTION 1 PRODUCT IDENTIFICATION

SYNONYMS: Sulfur: Solid, Granular or Ground
CHEMICAL NAME: Sulfur
FAMILY NAME: Element / Sulfur
CHEMICAL FORMULA: S₈
PRODUCT APPEARANCE: Yellow Solid



Distributors

The C.P. Hall Company

CHICAGO, ILLINOIS 60606 311 SOUTH WACKER DRIVE SUITE 4700 312-554-7400 FAX 312-554-7499
BEDFORD PARK, ILLINOIS 60439 7300 SOUTH CENTRAL AVENUE P.O. BOX 528 708-594-6000 FAX 708-458-0422
TORRANCE, CALIFORNIA 90503 444 ALASKA AVENUE 213-775-8555 FAX 310-618-0405
STOW, OHIO 44224 4460 HUDSON DRIVE 330-929-2311 FAX 330-929-3515
MEMPHIS, TENNESSEE 38113 2500 CHANNEL AVENUE 901-448-3663 FAX 901-774-7241

SECTION 2 INGREDIENT INFORMATION

Component	CAS Number	% By weight
Sulfur	7704-34-9	90 - 100

Dsha Hazard: This product is Hazardous as defined by OSHA

MATERIAL SAFETY DATA SHEET

Solid, Granular or Ground Sulfur

Page 3

SECTION 3 HEALTH, FIRST AID, & PROTECTION INFORMATION continued

INGESTION

EFFECT: Ingested Sulfur is converted to Sulfides in the gastrointestinal tract and ingestion of 10 - 20 grams has caused irritation of the GI tract and renal injury. Individuals with known allergies to sulfide drugs may also have allergic reactions to elemental sulfur.

FIRST AID: For large amounts ingested, if a victim is conscious and alert, give two (2) or more glasses of water to drink. If available, give one (1) tablespoon of Syrup of Ipecac to induce vomiting. If vomiting does occur, give fluids again. If vomiting has not occurred in twenty (20) minutes, the same dose of Syrup of Ipecac may be repeated one (1) additional time. Alternatively, vomiting may be induced by touching the back of the throat with a finger. Do not give anything by mouth to an unconscious or convulsing person. GET MEDICAL ATTENTION.

PROTECTION: None required. Do not eat.



NOTES TO PHYSICIAN: All treatments should be based on observed signs and symptoms of distress in the patient.

EXPOSURE LIMITS: No exposure limits have been established for Sulfur.

TOXICOLOGY:

ORAL LD ₅₀ (RATS):	>5000 mg/kg body weight
DERMAL LD ₅₀ (RATS):	>2000 mg/kg body weight
INHALATION LC ₅₀ :	No information available
SKIN EFFECTS (RABBITS):	No information available
EYE EFFECTS (RABBITS):	No information available

CARCINOGENICITY, TERATOGENICITY, MUTAGENICITY: This product does not contain any ingredient designated by NTP, IARC, or OSHA as a probable human carcinogen.

SECTION 4 FIRE & EXPLOSION HAZARD

FLASHPOINT: 405°F (207.2°C)
FLAMMABLE LIMITS: LEL: 3.3 UEL: 46.0
AUTOIGNITION TEMPERATURE: 478-511°F (248-266°C)

PRIMARY HAZARD: Sulfur dust suspended in air ignites easily and can result in an explosion in confined areas. Ignition can be caused by heat sources, friction and static electricity. Toxic gases will form upon combustion.

MATERIAL SAFETY DATA SHEET

Solid, Granular or Ground Sulfur

Page 5

SECTION 7 REACTIVITY DATA

Stability:	Stable
Conditions to Avoid(Instability):	Keep from heat, sparks, open flames and other heat sources.
Materials to Avoid(Incompatibility):	May react violently with strong oxidizing agents. Corrosive to copper and copper alloys. Damp Sulfur will corrode steel.
Hazardous Polymerization:	Will not occur.
Hazardous Decomposition Products:	Sulfur Dioxide gas produced by burning sulfur.

SECTION 8 DOT AND REGULATORY INFORMATION

TSCA: This product is listed on the TSCA Inventory at CAS Registry Number 7704-34-9.

CERCLA: If this product is accidentally spilled, it is not subject to any special reporting under the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). We recommend that you contact state and local authorities to determine if there are other local reporting requirements.

SARA TITLE III: Under the provisions of Title III, Sections 311/312 of the Superfund Amendments and Reauthorization Act, this product is classified into the following hazard category: **Delayed Health.**

<u>DOT:</u>	<u>Domestic & Canada</u>	<u>International & Water</u>
Shipping Name:	Sulfur*	Sulfur
Hazard Class:	9 (Misc. Hazardous materials)	4.1 (Flammable Solid)
ID Number:	NA1350	UN1350
Packing Group:	III	III
Label:	Class 9	Flammable Solid
Placard:	None Required	Class 4 (Flammable Solid)

Note Sulfur which is transported domestically is not subject to the requirements of Title 49 CFR Hazardous Materials Shipping Guidelines if transported in a non-bulk packaging or is formed to a specific shape (e.g., prills, granules, pellets, pastilles, or flakes).

Hazardous Substance/Rq: Not Applicable Not Applicable

This product is not a Marine Pollutant as defined in 40 CFR 172.



MATERIAL SAFETY DATA SHEET

RHEIN CHEMIE CORPORATION
 1014 Whitehead Road Ext.
 Trenton, NJ 08638

TRANSPORTATION EMERGENCY
 CALL CHEMTREC.....: (800) 424-9300
 INTERNATIONAL.....: (703) 527-3887

NON-TRANSPORTATION
 RCC EMERGENCY PHONE : (609) 771-9100
 RCC INFORMATION PHONE: (800) 289-2436

Section 1: Product and Company Identification

Product Name: POLY-DISPERSION ASD-75 55C
 Article Number: 1159325
 Product Code: 201240
 Chemical Family: Unvulcanized Rubber
 Chemical Name: Sulfur with Polymer Binder

Section 2: Composition/Information on Ingredients

HAZARDOUS INGREDIENTS

<u>Ingredient Name/ CAS Number</u>	<u>Exposure Limits</u>	<u>Concentration</u>	
		<u>Min.</u>	<u>Max.</u>
Sulfur 7704-34-9	OSHA (PEL): 5.00 mg/m ³ TWA Respirable Fraction 15.00 mg/m ³ TWA Total Dust ACGIH (TLV): 3.00 mg/m ³ TWA Respirable Fraction 10.00 mg/m ³ TWA Respirable Fraction	60%	100%
Exposure limit for: Particulates Not Other Classified (PNOC)			
Epoxidized Vegetable Oil NJTSRN: 00000151	OSHA (PEL): Not Established ACGIH (TLV): Not Established	3%	7%

Section 3: Hazards Identification

EMERGENCY OVERVIEW

Material Name: POLY-DISPERSION ASD-75 55C Article Number: 1159325

CAUTION! Color: Yellow Form: Solid Slab Odor: Slight Odor

May cause eye, skin, and respiratory tract irritation. May be harmful if inhaled. May be harmful if absorbed through skin. Ground containers and equipment before transferring to avoid static sparks. May form explosive dust-air mixtures. Sudden reaction and fire may result when mixed with oxidizing agents. Use cold water spray to cool fire-exposed containers to minimize the risk of rupture. Toxic gases/fumes are given off during burning or thermal decomposition.

POTENTIAL HEALTH EFFECTS

Route(s) of Entry: Inhalation, Skin Contact, Eye Contact

HUMAN EFFECTS AND SYMPTOMS OF OVEREXPOSURE**General Effects of Exposure****Acute Effects of Exposure:**

Direct eye contact with this product (dust) may cause some irritation. Symptoms of eye irritation include redness, tearing and pain. This product may be irritating to the skin with symptoms of redness and itching. Skin sensitization is rare but may occur. Absorption of dust may occur in open skin wounds causing fever and possible shock. It is expected that this product will be slightly toxic by ingestion. Inhalation may cause inflammation of the nasal mucosa which could lead to hyperplasia or tracheobronchitis. **** NOTE: Gases and fumes evolved during thermal processing or decomposition of this material may cause irritation to the eyes, skin, upper respiratory tract and mucous membranes of the nose and throat. Irritation of the respiratory tract may result in discomfort, and coughing.

Chronic Effects of Exposure:

Repeated and/or prolonged exposure may cause irritation to the mucous membranes with possible asthma. Conjunctivitis may occur to the eyes. There have been reports that repeated and/or prolonged exposure to sulfur has caused damage to the crystalline lens of the eye with the formation of opacities and cataracts.

Carcinogenic Components:

NTP: None

IARC: None

OSHA: None

Medical Conditions**Aggravated by Exposure:**

May aggravate existing eye, skin or respiratory conditions.

Section 4: First Aid Measures**First Aid for Eye:**

In case of contact, flush eyes with large quantities of water for at least 15 minutes. The eyelids should be held apart during irrigation to ensure thorough flushing of all eye tissue. Call a physician immediately.

First Aid for Skin:

Wash clothing and clean shoes before reuse. Immediately remove

contaminated clothing and shoes. In case of skin contact, wash affected areas with soap and water. Call a physician. ✓

First Aid for Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician. ✓

First Aid for Ingestion: Call a physician. If material is ingested, do not induce vomiting unless directed to do so by medical personnel. Get medical attention. ✓

Note to Physician: Treat symptomatically.

Section 5: Fire Fighting Measures

Flash Point: Not Established

Flammable Limits:

Upper Explosion Limit (UEL %): Not Established

Lower Explosion Limit (LEL %): Not Established

Auto-ignition Temperature: Not Established

Extinguishing Media:

Suitable: Water, Carbon Dioxide, Dry Chemical, Foam ✓

Special Fire Fighting Procedures:

A solid stream of water directed into the burning material could spread the fire. Evacuate non-emergency personnel to a safe area. Full emergency equipment with self-contained breathing apparatus and full protective clothing should be worn by firefighters. Use cold water spray to cool fire exposed containers. During a fire, irritating and toxic gases may be generated by thermal decomposition or combustion. Hydrogen sulfide (H₂S) formation is possible after prolonged heating. ✓

Unusual Fire/Explosion Hazards:

Dusts at sufficient concentrations can form explosive mixtures with air. Closed container may build up pressure and rupture when exposed to extreme heat. ✓

Section 6: Accidental Release Measures**Spill or Leak Procedures:**

Extinguish all ignition sources. Keep unnecessary personnel out of spill area. Emergency clean-up personnel should wear appropriate protection when entering the spill area for clean-up. Remove mechanically by method which minimizes generation of airborne dust, and place in appropriately marked containers for disposal. Spills should be collected using a properly grounded explosion-proof vacuum or by carefully sweeping up with a properly grounded dust pan and static-resistant type brush and placed in appropriately labeled DOT approved containers. Do not use compressed air to blow down the area. Do not allow spilled or released material to enter ground water, waste water or soil.

Section 7: Handling and Storage

- Storage Temperature:** Store at ambient conditions
- Shelf Life:** Not Established
- Special Sensitivity:** Heat, moisture, and incompatible materials.
- Handling/Storage Precautions:** Keep away from heat, sparks and flames. Store in a dry place away from excessive heat. Keep container tightly closed when not in use. All handling equipment should be properly grounded to prevent the build-up of electrostatic charges. Storage area should be equipped with sprinkler system. Handle in accordance with good industrial hygiene and safety practices.

Section 8: Exposure Controls/Personal Protection**Personal Protection Equipment**

- Eye Protection Requirements:** Safety glasses with side shields or goggles are recommended.
- Skin Protection Requirements:** Permeation resistant gloves (neoprene, nitrile, or PVC) and impervious clothing (long sleeve shirts) are recommended.
- Ventilation Requirements:** Use local exhaust ventilation if dusting or misting is a problem, to maintain air levels below the recommended exposure limit. Residual solvents and monomers may be released at elevated processing temperatures. Engineering controls should be sufficient to ensure airborne levels do not approach or exceed the exposure limits listed in Section 2.
- Respirator Requirements:** The specific respirator selected must be based on contamination levels found in the work place, must not exceed the working limits of the respirator and be jointly approved by the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration (NIOSH-MSHA). Air purifying respirator equipped with a full-face organic vapor and dust/mist cartridge if vapors are near or exceeding the exposure limits listed in Section 2. In areas of high concentrations, confined space or other poorly ventilated areas and for large spill clean-up sites, fresh air-line respirators or self-contained breathing apparatus should be used. Observe OSHA regulations for respirator use (29 CFR 1910.134.)
- Additional Protective Measures:** Emergency showers and eye wash stations should be available. Employees should wash their hands and face before eating, drinking, or using tobacco products. Educate and train employees on the safe use and handling of this product.

Section 9: Physical and Chemical Properties

Material Name: POLY-DISPERSION ASD-75 55C

Article Number: 1159325

Physical Form:	Solid
Appearance:	Slab
Color:	Yellow
Odor:	Slight Odor
pH:	Not Applicable
Boiling Point:	Not Applicable
Melting/Freezing Point:	Not Applicable
Solubility in Water:	Insoluble
Solubility (non Aqueous):	Not Established
Specific Gravity:	1.61
Bulk Density:	Not Established
Evaporation Rate:	Not Applicable
Vapor Pressure:	Not Applicable
Vapor Density:	Not Applicable

Section 10: Stability and Reactivity

Stability:	Stable ✓
Hazardous Polymerization:	Will not occur ✓
Substances to Avoid:	Chlorates, nitrates, oxidizing agents, carbides, heavy metals, reducing agents, and strong alkalis. ✓
Conditions to Avoid:	High Heat. ✓
Decomposition Temperature:	Not Established
Decomposition Products:	By fire and/or thermal decomposition: hydrogen sulfide, sulfur dioxide, carbon disulfide, acrylonitrile, 1,3-butadiene, hydrocarbons, hydrogen cyanide (HCN), oxides of nitrogen, oxides of carbon, and other undetermined aliphatic fragments.

Section 11: Toxicological Information

Toxicity Data for POLY-DISPERSION ASD-75 55C

Acute oral toxicity: > 5,000 mg/kg (Rat) Supplier Material Safety Data Sheet (MSDS)

Acute dermal toxicity: > 2,000 mg/kg (Rat) Supplier Material Safety Data Sheet (MSDS)

Toxicity Data for Sulfur

Acute oral toxicity: 5 g/kg (Rat)

Acute inhalation toxicity: 1,660 mg/m³

Eye Toxicity: Slightly irritating (Rabbit)

Skin Toxicity: Non-irritating (Rabbit)

Toxicity Data for Epoxidized Vegetable Oil

40 g/kg (Rat)

Acute dermal toxicity: > 20 g/kg (Rabbit)

Material Name: POLY-DISPERSION ASD-75 55C

Article Number: 1159325

Slightly irritating (Rabbit)
Slightly irritating (Rabbit)
Sensitization: No sensitization. (Guinea pig)

Section 12: Ecological Information**Ecological Data for POLY-DISPERSION ASD-75 55C**

Ecological Note: No data available for this product.

Ecological Data for Sulfur

Fish Toxicity: > 99,999 ug/L 96 Years Mosquitofish (*Gambusia affinis*) Mortality.

Invertebrate Toxicity: 160 ug/L 24 Days Ciliate (*Tetrahymena pyriformis*) LC50 (Mortality)

Ecological Note: No data available for this component.

Ecological Data for Epoxidized Vegetable Oil

> 99,999 ug/L 24 hrs Brine shrimp (*Artemia salina*) LC50 (Mortality)

Section 13: Disposal Considerations

Waste Disposal Method: Disposal must be in compliance with federal, state and local environmental control regulations. If incinerated, toxic and corrosive combustion gases must be properly handled.

Empty Container Precautions: Empty container retains product residue and can be hazardous.

Section 14: Transportation Information

Technical shipping name: Sulfur with Polymer Binder

Freight Class

Bulk: Synthetic Rubber

Package: Rubber Compounds, Unvulcanized (NMFC 171800)

Product Label: Product Label Established

Domestic Surface Transportation (DOT)

Hazard Class or Division: Non-Regulated

Marine Transportation (IMO / IMDG)

Hazard Class Division: Non-Regulated

Number:

Material Name: POLY-DISPERSION ASD-75 55C

Article Number: 1159325

Air Transportation (ICAO / IATA)

Hazard Class Division Non-Regulated
 Number:

Section 15: Regulatory InformationUnited States Federal Regulations

OSHA Hazcom Standard Hazardous
 Rating: ✓

TSCA Inventory List: On TSCA Inventory

CERCLA Hazardous Substance:

<u>Component(s)</u>	<u>Reportable Quantity</u>
None	

SARA Title IIISARA Section 302 Extremely Hazardous Substances:

<u>Component(s)/ CAS Number</u>	<u>Concentration</u>	
	<u>Min.</u>	<u>Max.</u>
None		

SARA Section 311/312 Hazard Categories: Immediate Health Hazard, Delayed Health Hazard

SARA Section 313 Toxic Chemicals:

<u>Component(s)/ CAS Number</u>	<u>Reporting Threshold</u>	<u>Concentration</u>	
		<u>Min.</u>	<u>Max.</u>
None			

RCRA Status: Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product, should be classified as a hazardous waste. (40 CFR 261.20-24)

The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

State Right-to-Know Information

<u>Component(s)/ CAS Number</u>	<u>State Code</u>	<u>Concentration</u>	
		<u>Min.</u>	<u>Max.</u>
Sulfur 7704-34-9	PA-H, NJ-H, MA-H	60%	100%
Acrylonitrile-Butadiene Copolymer 9003-18-3	PA-N, NJ-N	10%	30%
Epoxidized Vegetable Oil NJTSRN: 00000151	PA-N, NJ-N	3%	7%

The following component(s) are listed under Massachusetts Extra-ordinary Hazards:

Acrylonitrile 107-13-1	MA-X	0.001%
---------------------------	------	--------

Material Name: POLY-DISPERSION ASD-75 55C

Article Number: 1159325

The following component(s) are listed under California Proposition 65:

Vinyl Cyclohexane 100-40-3	CA-C	0.01%
Acrylonitrile 107-13-1	CA-C	0.001%
Butadiene 106-99-0	CA-C	0.0001%

State Code Translation Table

PA-N = Pennsylvania Non-hazardous
 PA-H = Pennsylvania Hazardous Substance List
 NJ-N = New Jersey Other - includes predominant ingredients
 NJ-H = New Jersey Hazardous Substance List
 MA-H = Massachusetts Hazardous Substance List
 MA-X = Massachusetts Extra-ordinary Hazardous Substance List
 CA-C = Warning! This chemical is known to the State of California to cause cancer.

Foreign Chemical Inventory List(s)

DSL (Canada): Listed

Section 16: Other Information

HMIS Rating

Health	*	2
Flammability		1
Reactivity		1

0=Minimal 1=Slight 2=Moderate 3=Serious 4=Severe

*=Chronic Health Hazard

RHEIM CHEMIE CORPORATION's method of hazard communication is comprised of Product Labels and Material Safety Data Sheets. HMIS and NFPA ratings are provided by RHEIM CHEMIE CORPORATION as a customer service.

Contact: Gaeta Copeland
 Phone: (412) 777-4766
 MSDS Number: R36356
 Version Date: 12/03/2001
 MSDS Version: 1.21

This information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of RHEIM CHEMIE CORPORATION. The data on this sheet relates only to the specific material designated herein. RHEIM CHEMIE CORPORATION assumes no legal responsibility for use or reliance upon these data.

Material Name: POLY-DISPERSION ASD-75 SSC

Article Number: 1159325

8 of 8

MATERIAL SAFETY DATA SHEET

SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MATHESON TRI-GAS, INC.
959 ROUTE 46 EAST
PARSIPPANY, NEW JERSEY USA
07054-0624 OR

530 WATSON STREET
WHITBY, ONTARIO, CANADA
L1N 5R9

EMERGENCY CONTACT:
CHEMTREC 1-800-424-9300

INFORMATION CONTACT:
(USA) 973-257-1100

(WHITBY) 905-668-3570
(EDMONTON) 780-471-4036

SUBSTANCE: PROPANE

TRADE NAMES/SYNONYMS:

MTG MSDS 76; N-PROPANE; DIMETHYLMETHANE; PROPYL HYDRIDE; R-290;
PROPYLHYDRIDE; LIQUEFIED PETROLEUM GAS; LPG; UN 1978; C3H8;
MAT19690; RTECS TX2275000

CHEMICAL FAMILY: hydrocarbons, aliphatic

CREATION DATE: Jan 24 1989

REVISION DATE: Mar 22 2001

SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: PROPANE

CAS NUMBER: 74-98-6

EC NUMBER (EINECS): 200-827-9

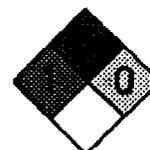
EC INDEX NUMBER: 601-003-00-5

PERCENTAGE: >99.9

SECTION 3 HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=4 REACTIVITY=0

EMERGENCY OVERVIEW:



FIRE AND EXPLOSION HAZARDS: Severe fire hazard. Severe explosion hazard. Gas/air mixtures are explosive. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.

EXTINGUISHING MEDIA: carbon dioxide, regular dry chemical

Large fires: Flood with fine water spray.

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Stop leak if possible without personal risk. Let burn unless leak can be stopped immediately. For smaller tanks or cylinders, extinguish and isolate from other flammables. Evacuation radius: 800 meters (1/2 mile). Stop flow of gas.

FLASH POINT: -157 F (-105 C)

LOWER FLAMMABLE LIMIT: 2.1%

UPPER FLAMMABLE LIMIT: 9.5%

AUTOIGNITION: 842 F (450 C)

SECTION 6 ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE:

Avoid heat, flames, sparks and other sources of ignition. Do not touch spilled material. Stop leak if possible without personal risk. Reduce vapors with water spray. Keep unnecessary people away, isolate hazard area and deny entry. Remove sources of ignition. Ventilate closed spaces before entering.

SECTION 7 HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.110. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Keep separated from incompatible substances.

SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

FREEZING POINT: -310 F (-190 C)
VAPOR PRESSURE: 6536 mmHg @ 20 C
VAPOR DENSITY (air=1): 1.55
SPECIFIC GRAVITY (water=1): 0.5853 @ -45 C
WATER SOLUBILITY: very slightly soluble
PH: Not applicable
VOLATILITY: Not applicable
ODOR THRESHOLD: 5000-20000 ppm
EVAPORATION RATE: Not applicable
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not applicable
SOLVENT SOLUBILITY:
Soluble: absolute alcohol, ether, chloroform, benzene, turpentine

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Minimize contact with material. Containers may rupture or explode if exposed to heat.

INCOMPATIBILITIES: oxidizing materials, combustible materials

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: oxides of carbon

POLYMERIZATION: Will not polymerize.

SECTION 11 TOXICOLOGICAL INFORMATION

PROPANE:
TARGET ORGANS: central nervous system
ADDITIONAL DATA: Stimulants such as epinephrine may induce ventricular fibrillation.

SECTION 12 ECOLOGICAL INFORMATION

Not available

SECTION 13 DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.

EC Classification may be inconsistent with independently-researched data.

DANGER/HAZARD SYMBOL:



F+

EC RISK AND SAFETY PHRASES:

R 12	Extremely flammable.
S 2	Keep out of reach of children.
S 9	Keep container in a well-ventilated place.
S 16	Keep away from sources of ignition - No smoking.

NATIONAL INVENTORY STATUS:

U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CANADA INVENTORY (DSL): Listed on inventory.

CANADA INVENTORY (NDSL): Not determined.

SECTION 16 OTHER INFORMATION

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MATERIAL SAFETY DATA SHEET

RHEIN CHEMIE CORPORATION
 1014 Whitehead Road Ext.
 Trenton, NJ 08638

TRANSPORTATION EMERGENCY
 CALL CHEMTREC.....: (800) 424-9300
 INTERNATIONAL.....: (703) 527-3887

NON-TRANSPORTATION
 RCC EMERGENCY PHONE : (609) 771-9100
 RCC INFORMATION PHONE: (800) 289-2436

Section 1: Product and Company Identification

Product Name: POLY-DISPERSION ASD-75 55C
Article Number: 1159325
Product Code: 201240
Chemical Family: Unvulcanized Rubber
Chemical Name: Sulfur with Polymer Binder

Section 2: Composition/Information on Ingredients

HAZARDOUS INGREDIENTS

<u>Ingredient Name/ CAS Number</u>	<u>Exposure Limits</u>	<u>Concentration</u>	
		<u>Min.</u>	<u>Max.</u>
Sulfur 7704-34-9	OSHA (PEL): 5.00 mg/m3 TWA Respirable Fraction 15.00 mg/m3 TWA Total Dust ACGIH (TLV): 3.00 mg/m3 TWA Respirable Fraction 10.00 mg/m3 TWA Respirable Fraction	60%	100%
Exposure limit for: Particulates Not Other Classified (PNOC)			
Epoxidized Vegetable Oil NJTSRN: 00000151	OSHA (PEL): Not Established ACGIH (TLV): Not Established	3%	7%

Section 3: Hazards Identification

EMERGENCY OVERVIEW

Material Name: POLY-DISPERSION ASD-75 55C | Article Number: 1159325

CAUTION! Color: Yellow Form: Solid Slab Odor: Slight Odor
May cause eye, skin, and respiratory tract irritation. May be harmful if inhaled. May be harmful if absorbed through skin. Ground containers and equipment before transferring to avoid static sparks. May form explosive dust-air mixtures. Sudden reaction and fire may result when mixed with oxidizing agents. Use cold water spray to cool fire-exposed containers to minimize the risk of rupture. Toxic gases/fumes are given off during burning or thermal decomposition.

POTENTIAL HEALTH EFFECTS

Route(s) of Entry: Inhalation, Skin Contact, Eye Contact

HUMAN EFFECTS AND SYMPTOMS OF OVEREXPOSURE

General Effects of Exposure

Acute Effects of Exposure:

Direct eye contact with this product (dust) may cause some irritation. Symptoms of eye irritation include redness, tearing and pain. This product may be irritating to the skin with symptoms of redness and itching. Skin sensitization is rare but may occur. Absorption of dust may occur in open skin wounds causing fever and possible shock. It is expected that this product will be slightly toxic by ingestion. Inhalation may cause inflammation of the nasal mucosa which could lead to hyperplasia or tracheobronchitis. **** NOTE: Gases and fumes evolved during thermal processing or decomposition of this material may cause irritation to the eyes, skin, upper respiratory tract and mucous membranes of the nose and throat. Irritation of the respiratory tract may result in discomfort, and coughing.

Chronic Effects of Exposure:

Repeated and/or prolonged exposure may cause irritation to the mucous membranes with possible asthma. Conjunctivitis may occur to the eyes. There have been reports that repeated and/or prolonged exposure to sulfur has caused damage to the crystalline lens of the eye with the formation of opacities and cataracts.

Carcinogenic Components:

NTP: None

IARC: None

OSHA: None

Medical Conditions

Aggravated by Exposure:

May aggravate existing eye, skin or respiratory conditions.

Section 4: First Aid Measures

First Aid for Eye:

In case of contact, flush eyes with large quantities of water for at least 15 minutes. The eyelids should be held apart during irrigation to ensure thorough flushing of all eye tissue. Call a physician immediately.

First Aid for Skin:

Wash clothing and clean shoes before reuse. Immediately remove

contaminated clothing and shoes. In case of skin contact, wash affected areas with soap and water. Call a physician.

First Aid for Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

First Aid for Ingestion: Call a physician. If material is ingested, do not induce vomiting unless directed to do so by medical personnel. Get medical attention.

Note to Physician: Treat symptomatically.

Section 5: Fire Fighting Measures

Flash Point: Not Established

Flammable Limits:

Upper Explosion Limit (UEL %): Not Established

Lower Explosion Limit (LEL %): Not Established

Auto-ignition Temperature: Not Established

Extinguishing Media:

Suitable: Water, Carbon Dioxide, Dry Chemical, Foam

Special Fire Fighting Procedures:

A solid stream of water directed into the burning material could spread the fire. Evacuate non-emergency personnel to a safe area. Full emergency equipment with self-contained breathing apparatus and full protective clothing should be worn by firefighters. Use cold water spray to cool fire exposed containers. During a fire, irritating and toxic gases may be generated by thermal decomposition or combustion. Hydrogen sulfide (H₂S) formation is possible after prolonged heating.

Unusual Fire/Explosion Hazards:

Dusts at sufficient concentrations can form explosive mixtures with air. Closed container may build up pressure and rupture when exposed to extreme heat.

Section 6: Accidental Release Measures**Spill or Leak Procedures:**

Extinguish all ignition sources. Keep unnecessary personnel out of spill area. Emergency clean-up personnel should wear appropriate protection when entering the spill area for clean-up. Remove mechanically by method which minimizes generation of airborne dust, and place in appropriately marked containers for disposal. Spills should be collected using a properly grounded explosion-proof vacuum or by carefully sweeping up with a properly grounded dust pan and static-resistant type brush and placed in appropriately labeled DOT approved containers. Do not use compressed air to blow down the area. Do not allow spilled or released material to enter ground water, waste water or soil.

Section 7: Handling and Storage

- Storage Temperature:** Store at ambient conditions
- Shelf Life:** Not Established
- Special Sensitivity:** Heat, moisture, and incompatible materials.
- Handling/Storage Precautions:** Keep away from heat, sparks and flames. Store in a dry place away from excessive heat. Keep container tightly closed when not in use. All handling equipment should be properly grounded to prevent the build-up of electrostatic charges. Storage area should be equipped with sprinkler system. Handle in accordance with good industrial hygiene and safety practices.

Section 8: Exposure Controls/Personal Protection**Personal Protection Equipment**

- Eye Protection Requirements:** Safety glasses with side shields or goggles are recommended.
- Skin Protection Requirements:** Permeation resistant gloves (neoprene, nitrile, or PVC) and impervious clothing (long sleeve shirts) are recommended.
- Ventilation Requirements:** Use local exhaust ventilation if dusting or misting is a problem, to maintain air levels below the recommended exposure limit. Residual solvents and monomers may be released at elevated processing temperatures. Engineering controls should be sufficient to ensure airborne levels do not approach or exceed the exposure limits listed in Section 2.
- Respirator Requirements:** The specific respirator selected must be based on contamination levels found in the work place, must not exceed the working limits of the respirator and be jointly approved by the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration (NIOSH-MSHA). Air purifying respirator equipped with a full-face organic vapor and dust/mist cartridge if vapors are near or exceeding the exposure limits listed in Section 2. In areas of high concentrations, confined space or other poorly ventilated areas and for large spill clean-up sites, fresh air-line respirators or self-contained breathing apparatus should be used. Observe OSHA regulations for respirator use (29 CFR 1910.134.)
- Additional Protective Measures:** Emergency showers and eye wash stations should be available. Employees should wash their hands and face before eating, drinking, or using tobacco products. Educate and train employees on the safe use and handling of this product.

Section 9: Physical and Chemical Properties

Physical Form:	Solid
Appearance:	Slab
Color:	Yellow
Odor:	Slight Odor
pH:	Not Applicable
Boiling Point:	Not Applicable
Melting/Freezing Point:	Not Applicable
Solubility in Water:	Insoluble
Solubility (non Aqueous):	Not Established
Specific Gravity:	1.61
Bulk Density:	Not Established
Evaporation Rate:	Not Applicable
Vapor Pressure:	Not Applicable
Vapor Density:	Not Applicable

Section 10: Stability and Reactivity

Stability:	Stable ✓
Hazardous Polymerization:	Will not occur ✓
Substances to Avoid:	Chlorates, nitrates, oxidizing agents, carbides, heavy metals, reducing agents, and strong alkalis. ✓
Conditions to Avoid:	High Heat. ✓
Decomposition Temperature:	Not Established
Decomposition Products:	By fire and/or thermal decomposition: hydrogen sulfide, sulfur dioxide, carbon disulfide, acrylonitrile, 1,3-butadiene, hydrocarbons, hydrogen cyanide (HCN), oxides of nitrogen, oxides of carbon, and other undetermined aliphatic fragments.

Section 11: Toxicological Information

Toxicity Data for POLY-DISPERSION ASD-75 55C

Acute oral toxicity: > 5,000 mg/kg (Rat) Supplier Material Safety Data Sheet (MSDS)

Acute dermal toxicity: > 2,000 mg/kg (Rat) Supplier Material Safety Data Sheet (MSDS)

Toxicity Data for Sulfur

Acute oral toxicity: 5 g/kg (Rat)

Acute inhalation toxicity: 1,660 mg/m³

Eye Toxicity: Slightly irritating (Rabbit)

Skin Toxicity: Non-irritating (Rabbit)

Toxicity Data for Epoxidized Vegetable Oil

40 g/kg (Rat)

Acute dermal toxicity: > 20 g/kg (Rabbit)

Slightly irritating (Rabbit)
Slightly irritating (Rabbit)
Sensitization: No sensitization. (Guinea pig)

Section 12: Ecological Information**Ecological Data for POLY-DISPERSION ASD-75 55C**

Ecological Note: No data available for this product.

Ecological Data for Sulfur

Fish Toxicity: > 99,999 ug/L 96 Years Mosquitofish (*Gambusia affinis*) Mortality.

Invertebrate Toxicity: 160 ug/L 24 Days Ciliate (*Tetrahymena pyriformis*) LC50 (Mortality)

Ecological Note: No data available for this component.

Ecological Data for Epoxidized Vegetable Oil

> 99,999 ug/L 24 hrs Brine shrimp (*Artemia salina*) LC50 (Mortality)

Section 13: Disposal Considerations

Waste Disposal Method: Disposal must be in compliance with federal, state and local environmental control regulations. If incinerated, toxic and corrosive combustion gases must be properly handled.

Empty Container Precautions: Empty container retains product residue and can be hazardous.

Section 14: Transportation Information

Technical shipping name: Sulfur with Polymer Binder

Freight Class

Bulk: Synthetic Rubber

Package: Rubber Compounds, Unvulcanized (NMFC 171800)

Product Label: Product Label Established

Domestic Surface Transportation (DOT)

Hazard Class or Division: Non-Regulated

Marine Transportation (IMO / IMDG)

Hazard Class Division: Non-Regulated

Number:

Air Transportation (ICAO / IATA)

Hazard Class Division Non-Regulated
 Number:

Section 15: Regulatory Information**United States Federal Regulations**

OSHA Hazcom Standard Hazardous
 Rating:

TSCA Inventory List: On TSCA Inventory

CERCLA Hazardous Substance:

<u>Component(s)</u>	<u>Reportable Quantity</u>
None	

SARA Title III**SARA Section 302 Extremely Hazardous Substances:**

<u>Component(s)/</u> <u>CAS Number</u>	<u>Concentration</u>	
	<u>Min.</u>	<u>Max.</u>
None		

SARA Section 311/312 Hazard Categories: Immediate Health Hazard, Delayed Health Hazard

SARA Section 313 Toxic Chemicals:

<u>Component(s)/</u> <u>CAS Number</u>	<u>Reporting</u> <u>Threshold</u>	<u>Concentration</u>	
		<u>Min.</u>	<u>Max.</u>
None			

RCRA Status: Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product, should be classified as a hazardous waste. (40 CFR 261.20-24)

The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

State Right-to-Know Information

<u>Component(s)/</u> <u>CAS Number</u>	<u>State Code</u>	<u>Concentration</u>	
		<u>Min.</u>	<u>Max.</u>
Sulfur 7704-34-9	PA-H, NJ-H, MA-H	60%	100%
Acrylonitrile-Butadiene Copolymer 9003-18-3	PA-N, NJ-N	10%	30%
Epoxidized Vegetable Oil NJTSRN: 00000151	PA-N, NJ-N	3%	7%

The following component(s) are listed under Massachusetts Extra-ordinary Hazards:

Acrylonitrile 107-13-1	MA-X	0.001%
---------------------------	------	--------

The following component(s) are listed under California Proposition 65:

Vinyl Cyclohexane 100-40-3	CA-C	0.01%
Acrylonitrile 107-13-1	CA-C	0.001%
Butadiene 106-99-0	CA-C	0.0001%

State Code Translation Table

PA-N = Pennsylvania Non-hazardous
 PA-H = Pennsylvania Hazardous Substance List
 NJ-N = New Jersey Other - includes predominant ingredients
 NJ-H = New Jersey Hazardous Substance List
 MA-H = Massachusetts Hazardous Substance List
 MA-X = Massachusetts Extra-ordinary Hazardous Substance List
 CA-C = Warning! This chemical is known to the State of California to cause cancer.

Foreign Chemical Inventory List(s)

DSL (Canada): Listed

Section 16: Other Information

HMIS Rating

Health	*	2
Flammability		1
Reactivity		1

0=Minimal 1=Slight 2=Moderate 3=Serious 4=Severe

*=Chronic Health Hazard

RHEIM CHEMIE CORPORATION's method of hazard communication is comprised of Product Labels and Material Safety Data Sheets. HMIS and NFPA ratings are provided by RHEIM CHEMIE CORPORATION as a customer service.

Contact: Gaeta Copeland
 Phone: (412) 777-4766
 MSDS Number: R36356
 Version Date: 12/03/2001
 MSDS Version: 1.21

This information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of RHEIM CHEMIE CORPORATION. The data on this sheet relates only to the specific material designated herein. RHEIM CHEMIE CORPORATION assumes no legal responsibility for use or reliance upon these data.

Material Name: POLY-DISPERSION ASD-75 55C

Article Number: 1159325

8 of 8

(COMPOSITION/INFORMATION ON INGREDIENTS - Continued)

KYANITE	1302-76-7	2
COARSE STAUROLITE:		
STAUROLITE	12182-56-8	85
TITANIUM MINERALS		10
QUARTZ	14808-60-7	<5
"STARBLAST":		
STAUROLITE	12182-56-8	86
TITANIUM MINERALS		6
QUARTZ	14808-60-7	<5
ZIRCON	14940-68-2	3
KYANITE	1302-76-7	2
"STARBLAST" XL:		
STAUROLITE	12182-56-8	90
TITANIUM MINERALS		6
ZIRCON	14940-68-2	2
KYANITE	1302-76-7	1
QUARTZ	14808-60-7	<1
"STARBLAST" ULTRA		
STAUROLITE	12182-56-8	85
TITANIUM MINERALS		7
QUARTZ	14808-60-7	<5
ZIRCON	14940-68-2	3
KYANITE	1302-76-7	2

HAZARDS IDENTIFICATION

Potential Health Effects

Eye contact with the product may cause irritation with discomfort, tearing, or blurring of vision.

The product, as shipped, does not pose an inhalation health hazard because it contains essentially no particles in the respirable size range. However, if during handling or use the particles are broken down to a size that can be inhaled, the dusts may be harmful to the respiratory system. Individuals with preexisting conditions of the lungs may have increased susceptibility to the toxicity of excessive exposures.

Staurolite Products contain trace quantities (<5%) of quartz. The predominant effect of overexposure to airborne respirable quartz in humans is silicosis. Silicosis is a chronic disease characterized by formation of silica-containing scar tissue in the lungs with symptoms of coughing, dyspnea, wheezing and nonspecific respiratory ailments. Very high short exposures to Crystalline Silica may lead to fatality from gross overexposure.

Several recent epidemiology studies have shown that in addition to silicosis, there is limited evidence of an excess of lung cancer in occupations involving exposures

(HAZARDS IDENTIFICATION - Continued)

mainly to Crystalline Silica, such as stone cutters and granite industry workers.

Staurolite Products contain trace quantities (less than or equal to 28 pCi/g) of naturally occurring radioactive uranium and thorium (less than or equal to 200 ppm total uranium and thorium or 0.02 % w/w), and (less than or equal to 28 pCi/g) radium. Naturally Occurring Radioactive Material, namely uranium, thorium, and their decay products, is commonly referred to as "NORM".

The main radiological hazard from the product is internal exposure from small amounts of alpha particles given off by inhaled dust. Industrial hygiene practices aimed at control of airborne dust can lessen the potential for exposure. Overexposure by inhalation to inhaled dusts containing radioactive uranium, thorium, and radium may cause lung cancer. Low level gamma radiation in proximity to bulk or bagged stockpiles of zircon may present a lesser, external exposure that can be managed by limiting close proximity for long time periods to large volumes of material.

Staurolite is exempt from Nuclear Regulatory Commission (NRC) regulations for source material per 10 CFR 40, since it falls under the definition of "unimportant quantity source material" containing less than 0.05% uranium or thorium. Some states may apply NRC type radiation protection standards for NORM above background levels, or may have NORM specific regulations. It is recommended that you consult and comply with current regulations.

With respect to dust exposure (8 hr/day TWA basis, 10 um aerodynamic, or about 5 um physical diameter particle size used for calculation purposes), evaluation and calculation of OSHA PEL's (29 CFR 1910), ACGIH TLV's, and NRC standards (10 CFR 20) for trace crystalline silica, and trace radionuclides indicate that a level of approximately 4.3 mg/m³ of total dust (or 1.0 mg/m³ of respirable dust) will ensure that intake is less than the NRC public dose limit for radionuclides, and less than OSHA and ACGIH limits for respirable and total quartz. Quartz is the most limiting of the trace components. If during handling or use the particles are broken down to finer particle sizes, lower levels of total dust would apply.

Carcinogenicity Information

The following components are listed by IARC, NTP, OSHA or ACGIH as carcinogens.

Material	IARC	NTP	OSHA	ACGIH
QUARTZ	1	X		A2

DuPont controls the following materials as carcinogens:

(HAZARDS IDENTIFICATION - Continued)

QUARTZ.

FIRST AID MEASURES

First Aid

INHALATION

If inhaled, immediately remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

The compound is not hazardous by skin contact, but removal of particles and cleansing the skin after use is advisable.

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

No specific intervention is indicated as the compound is not hazardous by ingestion. However, if symptoms occur, consult a physician.

FIRE FIGHTING MEASURES

Flammable Properties

Will not burn.

Extinguishing Media

As appropriate for combustibles in area.

Fire Fighting Instructions

None.

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Accidental Release Measures

Sweep up spillage.

HANDLING AND STORAGE

Handling (Personnel)

Avoid breathing dust. Wash thoroughly after handling.

If handling respirable flour, use of gloves and washing before eating, drinking, applying cosmetics or smoking is advisable to minimize dust inhalation or ingestion from hands.

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

Use sufficient ventilation to keep employee exposure below recommended limits.

If using this product as an abrasive blast agent in confined areas, airborne dust levels should be controlled by physical enclosure of the abrasive blasting operation. The enclosure should be exhaust ventilated in accordance with 29 CFR 1910.94 Ventilation (a) Abrasive blasting.

Personal Protective Equipment

EYE/FACE PROTECTION

Wear safety glasses with side shields.

RESPIRATORS

A NIOSH approved air-purifying respirator with a type 100 (high efficiency) particulate cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air-purifying respirators is limited. Use a NIOSH approved positive pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection.

For abrasive blasting use a type CE abrasive-blast supplied-air respirator covering head, neck, and shoulders to provide protection from rebound abrasive per 29 CFR 1910.94 (a) (5).

PROTECTIVE CLOTHING

Wear impervious clothing, such as gloves, apron, boots or whole bodysuit, as appropriate.

(EXPOSURE CONTROLS/PERSONAL PROTECTION - Continued)

Exposure Guidelines

Applicable Exposure Limits

QUARTZ

PEL (OSHA)	: Total dust, (30 mg/m ³ / % SiO ₂ + 2) Respirable dust, (10 mg/m ³ / % SiO ₂ + 2) as 8 Hr TWA's
TLV (ACGIH)	: 0.05 mg/m ³ , respirable dust, 8 Hr. TWA, A2 Notice of Intended Changes (2004) 0.025 mg/m ³ , respirable dust, 8 Hr. TWA, A2
AEL * (DuPont)	: 0.1 mg/m ³ , 8 Hr. TWA, respirable dust 0.05 mg/m ³ , 12 Hr. TWA, respirable dust

ZIRCON

PEL (OSHA)	: 5 mg/m ³ , 8 Hr. TWA, as Zr
TLV (ACGIH)	: 5 mg/m ³ , 8 Hr. TWA, as Zr, A4 STEL 10 mg/m ³ , as Zr, A4
AEL * (DuPont)	: None Established

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Vapor Pressure	: Not volatile
Vapor Density	: Not volatile
Melting Point	: 1,370 C (2,500 F)
Evaporation Rate	: (Butyl Acetate = 1) Not volatile
Solubility in Water	: Insoluble
Odor	: Odorless
Form	: Solid, free-flowing sand
Color	: Reddish brown
Specific Gravity	: 3.7

STABILITY AND REACTIVITY

Chemical Stability

Stable.

Incompatibility with Other Materials

None reasonably foreseeable.

(STABILITY AND REACTIVITY - Continued)

Decomposition

Decomposition will not occur.

Polymerization

Polymerization will not occur.

TOXICOLOGICAL INFORMATION

Animal Data

Quartz:

Oral ALD: > 11,000 mg/kg in male rats

Quartz is not a skin irritant or a skin sensitizer in animals, but is a mild eye irritant. Single doses of 50 mg Quartz administered by intratracheal instillation have resulted in pulmonary fibrosis at 60 and 120 days post exposure in rats. Repeated and chronic exposures as low as 0.7 mg instillation and 12 mg/m³ by inhalation resulted in pulmonary fibrosis, inflammation, edema and emphysema in animals exposed to Quartz. Lung tumors were observed in rats exposed for up to two years by inhalation to 12.4 or 51.6 mg/m³ Quartz. Lung tumors were also observed in rats exposed to Quartz by intratracheal instillation. Silica was positive in mammalian cell cultures for cell transformation and chromosomal effects. It was negative in cell culture assays for gene mutation in bacteria and DNA damage in mammalian cells and in a whole animal assay for chromosomal effects. No animal test reports are available to define developmental, or reproductive toxicity.

DISPOSAL CONSIDERATIONS

Waste Disposal

Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local regulations.

If approved, may be transferred to a land disposal site.

NOTE:

Some states have, or are developing, new regulations for disposal of waste containing Naturally Occurring Radioactive Materials (NORM) above background levels. It is recommended that you consult and comply with current regulations.

TRANSPORTATION INFORMATION

Shipping Information

Shipping Containers

Hopper Cars
Hopper Trucks
Bags
Semi-bulk Bags

STAUROLITE PRODUCTS ARE NOT REGULATED AS A HAZARDOUS
MATERIAL BY DOT OR IMO.

REGULATORY INFORMATION

U.S. Federal Regulations

TSCA Inventory Status : Reported/Included.

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute : No
Chronic : Yes
Fire : No
Reactivity : No
Pressure : No

LISTS:

SARA Extremely Hazardous Substance -No
CERCLA Hazardous Material -No
SARA Toxic Chemical -No

Staurolite is exempt from Nuclear Regulatory Commission (NRC) regulations for source material per 10 CRF 40, since it falls under the definition of "unimportant quantity source material" containing less than 0.05% uranium or thorium.

CANADIAN WHMIS CLASSIFICATION:

D-2A

OTHER INFORMATION

NFPA, NPCA-HMIS

NPCA-HMIS Rating
Health : 1
Health : x (Chronic Health Effects)
Flammability : 0
Reactivity : 0

(Continued)

Personal Protection rating to be supplied by user depending on use conditions.

Additional Information

WARNING!

This product contains quartz and radionuclides which is known to the state of California to cause cancer.

MEDICAL USE: CAUTION: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, see DuPont CAUTION Bulletin No. H-50102.

The required testing has not been done to qualify any of our grades for direct inclusion in food, drugs, or cosmetic formulations.

For further information, see DuPont Staurolite Sands Data Sheet.

Please see www.titanium.dupont.com for the latest version of this MSDS.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Responsibility for MSDS : MSDS Coordinator
> : DuPont Titanium Technologies
Address : Wilmington, DE 19898
Telephone : (800) 441-9485

Indicates updated section.

This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience is gained.

End of MSDS