SITE SPECIFIC HEALTH AND SAFETY PLAN FOR THE REMOVAL AND OFF-SITE DISPOSAL OF DRUMS GENERALLY HAULING DRUM SITE ST CLAIR, MISSOURI

Prepared for

Interco
St Clair, Missouri

OHM Remediation Services Corp

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Project

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1 0 INTRODUCTION

[Excerpted from E&E, Inc data summary (11-14-88)]

The Generally Hauling Drum site is located in a rural area approximately 6 miles northeast of St Clair, Missouri, along State Route TT St Clair is approximately 55 miles southwest of St Louis, Missouri on Interstate 44 in Franklin County The Generally Hauling site was once part of a privately owned landfill that is situated along the access road of a currently operating landfill John Generally, current owner of the abandoned drum site, purchased the property in 1986 and discovered the approximately 250 to 300 drums scattered in three primary locations along abandoned access roads The drums are believed to be wastes from local shoe manufacturers near St Clair and Sullivan, Missouri, and may have been disposed of up to 15 years ago The Majority of the drums have deteriorated to the point that the contents have solidified Only nine drums were found to contain liquids that may be threatening to the local environment None of the solidified materials from the abandoned drums were sampled at the advice of the EPA on-site coordinator (OSC)

The Generally Hauling site is located within the Ozark Border region and is typical of the regional topography with rolling hills and dissected ridges The predominant on site soil is the Union Silt Loam, which is derived primarily from loess and forms on 5 to 9 percent slopes A cherty dense fragipan typically lies below the solum and greatly restricts movement of water into the subsurface (USDA 1985)

The bedrock in the St Clair, Missouri area is Ordovician in age and belongs to the Canadian Series Due to post Ordovician faulting, uplifting, and subsequent erosion, the bedrock outcrops at various locations on the surface at and near the site The Ordovician-age rocks underlying the site are highly stratified and classified nito the Smithville, Roubidoux, and Gasconade formations Dolomite and sandstone (with a minor chert component) are the principal constituents of the bedrock Karst development is likely (Missouri Geologic Survey 1961)

Surface runoff flows west to east across the site and eventually flows into an intermittent stream that flows north Surface flow ultimately reaches the Missouri River The area is characterized as having a strong subsurface flow component, partially a result from the suspected karst Cove spring, source for Cove Creek (an intermittant creek flowing south into the Meramac River), lies approximately 700 feet

southeast of the site However, Cove Creek flows into the Meramac watershed and may not be a surface runoff route related to the site Average annual total precipitation for the St Clair, Missouri area is 40 inches (USDA 1985)

The Missouri Department of Natural Resources (MDNR) visited the site at the request of Generally in February of 1986 (Alderson 1985) MDNR collected eight drum samples, three surface soil samples, and one residential well sample The analytical results indicated the drum contents to be suspected resins and/or dyes from a local shoe manufacturer MDNR did not recommend further work until July 1987 when the EPA was asked to evaluate the site for a potential removal action

This site safety plan is prepared in accordance with the standards established by the United States Occupational Safety and Health Administration (OSHA) for hazardous waste sites Specifically, this safety plan complies with the appropriate sections of 29 CFR 1910 120, "Hazardous Waste Operations and Emergency Response "

1 1 LOCATION

The location of the job site is as follows

Generally Hauling Drum Site
St Clair, Missouri

1 2 SCOPE OF WORK

The scope of work is defined as follows

- o Mobilization and site setup
- o Drum recovery and staging
- o Drum sampling and overpacking
- o Consolidation when possible and disposal of drums
- o Demobilization

1 3 OHM MANAGEMENT ORGANIZATION

The OHM management organization on this project will be as follows

- o Project Manager--This person is ultimately responsible for all phases of project preparation, scope of work and detail completion The site supervisor reports directly to him or her

- o Site Supervisor--All personnel working on the site ultimately reports to this individual who has

authority over all phases and is the senior OHM on-site representative

- General Foreman--This individual's duty is to disseminate information, assign tasks, and coordinate efforts between the multiple OHM crews This person reports directly to the project supervisor

- Foreman--This individual's duty is to coordinate the activities of a specific work crew This person reports to the general foreman

- Site Safety Officer (SSO)--This individual is responsible for implementation and enforcement of the site safety plan, air monitoring, accident reporting, etc He/she does have power to shut down any project phase or operation deemed either inherently dangerous to life and health or not in compliance with general agreement of the site safety plan In addition, he/she can cause the removal of any person who is deemed inherently unsafe or a threat to the safety of others For this project, the site supervisor will assume the duties of the SSO

2 0 PROJECT HAZARDS

The three main divisions of hazards at this site are chemical, physical, and environmental

2 1 CHEMICAL HAZARDS

This site has various chemicals present It is the intent of this section to categorize the chemicals present, discuss relevant exposure limits (OSHA PEL, NIOSH REL, and ACGIH) and describe the acute and chronic health effects of the chemicals present

Eight of the nine drums sampled are considered ignitable The ignitability of the materials warrants use of non-sparking tools, hot work permits, air monitoring with LEL/0_2 meter and adequate separation from sparking or ignitable situations, e i , no smoking or lighters in area, etc Fire preparations include, but are not limited to, portable and accessible fire extinguishers and the fire department telephone number

The waste materials which have been identified and sampled all contain semi-volatiles, volatiles, and heavy metals

The soil, although not highly contaminated, does contain semi-volatiles, volatiles, and heavy metals as well The health effects, symptoms and exposure routes of the identified compounds are as follows

- Semi-volatiles--the semi-volatiles are primarily contained in the nine drums and include the following compounds diethylphthalate, napthalene, benzy alcohol, benzoic acid, and methyl phenols Primary exposures for these materials include inhalation, ingestion and skin contact Acute effects from exposure may include irritation of the skin, eyes, nose, throat and gastrointestinal tract Other noted effects resulting from acute exposure are those resulting from an attack of the CNS (Central Nervous System) and include dizziness, weakness, nausea, fatigue, headache and eventually may lead to unconsciousness Chronic exposure may result in dermatitis defatting of the skin liver, kidney and brain damage and chemical pneumonitis which may prove fatal Overexposure to these materials has also been noted to cause an increased incidence in mononuclear cell leukemia

Exposure Limits for Semi-Volatiles

Compound	OSHA PEL	ACGIH TLVs
Benzoic acid	non-listed	non-listed
Napthalene	10 ppm	10 ppm
Methylphenol		5 ppm
Benzyl Alcohol	non-listed	non-listed
Diethyl Phthalate		5 mg/m^3
Isophorone	25 ppm	5 ppm

- Volatiles--the volatiles present on this site are primarily contained in the drums The volatiles of concern are toluene and 2 butanone Both must be considered as flammable materials For the purpose of health and safety , these two chemicals can be categorized and treated similarly in terms of exposure routes, acute and chronic health effects, and warning signs

  As a class of compounds, acute inhalation exposure to concentrations over the PEL or TLV may result in eye, nose, and throat irritation The central nervous system will also be effected and euphoria, dizziness, and/or depression may result Chronic exposure to volatiles may damage the kidneys, liver, blood forming organs, and peripheral nervous system

  Permissible exposure limits (PEL) and threshold limit values (TLV) to airborne exposures to the aforementioned compounds are presented below in tabular form

Compound	OSHA PEL	ACGIH TLV
Toluene		100 ppm
2-butanone	200 ppm	200 ppm

- Heavy Metals--The heavy metals present on this site are contained in the soil surface and drums The heavy metals of concern are lead, zinc, mercury, chromium, and barium As a general class of heavy metals, the acute and chronic exposure symptoms and health effects are as follows

- Acute exposure eye, nose, and throat irritation, coughing, upset stomach, nausea, shortness of breath, weakness, chills and fever, headache, hoarseness, diarrhea, coughing up blood, skin rash

- Chronic exposure poor coordination, difficulty in speaking, tremors (shakes), kidney damage, liver damage, unstable emotions, recurring chills and fever--some metals are carcinogenic

For specific effects from a site chemical refer to its MSDS in Appendix A

The known and unknown mixed chemical hazards at this site prevent a clear determination of the specific effects of discrete compounds Therefore, personnel must be alert for symptoms of possible exposure such as unusual smells, stinging, burning eyes, nose, and throat, skin irritation, as well as feeling extremely well, depressed, sleepy, or tired Symptoms must be immediately reported to the site supervisor

2 1 1 Hazard Communication

The purpose of hazard communication (Employee Right-to-Know) is to ensure that the hazards of all chemicals located at this field project site are transmitted (communicated) according to 29 CFR 1926 59 to all OHM personnel and OHM subcontractors Hazard communication will include the following

o Container Labeling--OHM personnel will ensure that all drums and containers are labeled according to contents These drums and containers will include those from manufacturers and those produced on site by operations All incoming and outgoing labels shall be checked for identity, hazard warning, and name and address of responsible party

o MSDSs--There will be an MSDS located on site for each hazardous chemical known to be or used on site All MSDSs will be located in Appendix A of the site safety plan The site safety plan can be found in the project office trailer

o Employee Information and Training--Training employees on chemical hazards is accomplished through on ongoing corporate training program Additionally, chemical hazards are communicated to employees through daily safety meetings held at OHM field projects and by an initial site orientation program

At a minimum, OHM employees will be instructed on the following

- Chemicals and their hazards in the work area
- How to prevent exposure to these hazardous chemicals
- What the company has done to prevent workers' exposure to these chemicals
- Procedures to follow if they are exposed to these chemicals
- How to read and interpret labels and MSDSs for hazardous substances found on OHM sites
- Emergency spill procedures
- Proper storage and labeling

Before any new hazardous chemical is introduced on site, each employee will be given information in the same manner as during the safety class The site supervisor will be responsible for seeing that the MSDS on the new chemical is available The information pertinent to the chemical hazards will be communicated to project personnel

Morning safety meetings are held and the hazardous materials used on site will be discussed Attendance is mandatory for all employees

Refer to Appendix A of the site safety plan to find MSDSs for chemicals specific to the site

2 2 PHYSICAL HAZARDS

There are numerous physical hazards associated with this project which, if not identified and addressed could present operational problems as well as cause accidents and personal injury to the work force Hazard identification and mitigation, training, adherence to work rules and careful housekeeping can prevent many problems or accidents arising from physical hazards The following will outline the major physical hazards and the suggested preventative measures to be followed during this project

- Drum Handling--All drum sampling and or drum handling personnel shall wear the appropriate Level B or C personal protective equipment and follow decontamination protocol to prevent exposure from chemicals Appropriate care shall be taken when handling drums

so as not to pinch fingers or strain backs Powered equipment should be utilized whenever possible when lifting drums with contents

- Bulky or Heavy Loads--Intelligent thought shall be exercised before heavy and bulky loads are lifted or handled manually by personnel Mechanical equipment such as fork-lifts, wheel barrows, hand-trucks, loaders, and cranes shall be utilized when possible and needed **Note Back injuries are real, debilitating, unproductive, and costly to both employees and employers, and sometimes permanent Back injury prevention must be given high priority on all project sites If you think the load you are about to lift is too heavy or bulky, it probably is' Get help or utilize mechanical equipment**

- Explosion Hazard--Flammable materials in confined spaces can produce an explosive atmosphere which can be triggered by a spark or other energy source To prevent this type of accident, the concentration of flammable material in air will be carefully monitored

- Flame, Heat, or Spark Producing Operations--Because of the possibilities of flammable materials being present at this site, flame, heat, or spark producing operations will be limited If a case arises where that is necessary, OHM will follow the procedures outlined in Appendix B--Hot Work Permit

- Small Quantity Flammable Liquids--Small quantities of flammable liquids will be stored in "safety" cans and labeled according to contents

- Electrical Hazards--Electrical devices and equipment must be de-energized prior to working near them All extension cords must be kept out of water, protected from crushing, i e , roadway, and inspected regularly to ensure structural integrity Temporary electrical circuits must be protected with ground fault interrupters Only qualified electricians are authorized to work on electrical circuits

- Slip/Trip/Fall Hazards--Some areas may have oil laden surfaces which will greatly increase the possibility of inadvertent slips Caution must be exercised when using steps and stairs due to slippery surfaces in conjunction with the fall hazard Good housekeeping practices is essential to minimize the trip hazards

2 3 ENVIRONMENTAL HAZARDS

The primary environmental hazards to be considered during site specific work are heat stress and cold stress

2 3 1 Heat Stress

Heat stress may affect the personnel wearing protective clothing in conjunction with high ambient temperatures and solar heat load Plenty of fluids, rest breaks, and careful attention by supervisors will be used as control measures As a minimum, the following precautions will be taken

1 The general topic of heat stress will be the subject of the first training session This presentation should include recognition of heat stress, heat stress prevention, and specifically outline the following requirements in Paragraphs 2 and 3 As a reference, the article, "Heat Stress at Hazardous Material Activities--Prevention is the Solution" shall be used This reference is attached as Appendix C

2 Personnel who are actively engaged on site may need to weigh in and out daily Body weight loss greater than 5 percent will require that personnel restrict some activities until the weight loss can be corrected

3 All personnel shall drink one pint of water or other appropriate fluid prior to commencing work each day At each break, tepid water and electrolyte fluids shall be made available Each person should drink fluids at the break consistent with his/her fluid loss recognizing that his/her level of thirst is not a good indicator of fluid loss Fluids intake will be mildly forced

2 3 2 Cold Stress

Working outside in conditions of low ambient temperatures can subject workers to cold stress which includes frost bite and hypothermia At a minimum, the following precautions will be taken

- Training session will be regularly held to emphasize warning symptoms such as reduced coordination, drowsiness, impaired judgments, fatigue, and numbing of toes and fingers

- Workers will be outfitted with winter clothing

- Clothing will be changed as soon as it becomes wet
- Warm shelters and regular rest periods will be available for crew members
- Warm beverages will be provided

3 0 WORK AND SUPPORT AREAS

To prevent both exposure to unprotected personnel and migration of contamination due to tracking by personnel or equipment, work areas along with personal protective equipment and decontamination requirements will be clearly identified

3 1 DESIGNATION OF ZONES

OHM designated work areas or zones as suggested in "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," NIOSH/OSHA/USCG/EPA, November, 1985 The areas surrounding each of the work areas will be divided into three zones

- o Exclusion or "hot" zone
- o Contamination reduction zone
- o Support zone

3 2 EXCLUSION ZONE

The exclusion zone will consist of the active work areas where sampling is taking place or where remediation activities are taking place The perimeter of the zones will be sufficiently large to protect unprotected personnel from contact with either dusts or vapors arising from the operations The perimeters will be marked with brightly colored hazard tape All personnel entering these areas must wear the prescribed level of protective equipment

3 3 CONTAMINATION REDUCTION ZONE

The contamination reduction zone will be clearly marked corridor(s) between the exclusion and support zones, this is where personnel will begin the sequential decontamination process when exiting the exclusion zone To prevent cross contamination and for accountability purposes, all personnel will enter and leave the exclusion zone through the contamination reduction zone

3 4 SUPPORT ZONE

The support zone will consist of those areas around the exclusion zone where support trailers and equipment are staged This will be in a clean area such as on the asphalt parking lot Eating, smoking, and drinking will be allowed only in this area

4 0 HAZARD ANALYSIS

A risk analysis for this project has been developed to examine safety and health hazards inherent with each separate project phase The goal of this exercise is to enable personnel to recognize, evaluate, and control hazards before they develop and affect personnel or the environment

For the purposes of hazard analysis, this project can be divided into six separate phases as follows

- o Mobilization and site preparation
- o Drum handling, opening, and sampling
- o Field analysis for bulking
- o Field Compatibilities
- o Consolidate, stage, and/or loadout of contaminated waste material
- o Demobilization

4 1 MOBILIZATION AND SITE PREPARATION

This project phase involves moving material and trailers to the site in order to commence operations establish the administrative headquarters, set up exclusion zone barriers and prepare decontamination stations Since these operations will be conducted in a noncontaminated area, the work crew will not be exposed to any unusual chemical hazard

Physical hazards are mainly associated with accidental striking or being run over by motorized equipment Careful driving and manipulation of equipment will prevent such accidents Only qualified, knowledgeable personnel using approved methods will be permitted to install the electrical system to prevent accidental electrocution Adherence to generally accepted safety protocol shall be required

4 2 DRUM HANDLING, OPENING, AND SAMPLING

The chemical hazards shall be minimized by having personnel wear full Level B or C protection when sampling, opening and handling drums However, if the drum is adequately labeled and does not exceed 10 ppm on the PID or 10 percent LEL on the LEL/O_2 after opening, Level C without acid gear will be sufficient To minimize other hazards, drums

shall be inspected and their integrity assured prior to moving or opening Unlabeled drums shall be considered to contain hazardous substances and handled accordingly until the contents are identified Drum and container movement shall be minimized throughout the duration of the project

Prior to the movement of drums and containers, all employees involved in the drum handling activity shall be warned of these potential hazards U S D O T specified salvage drums and absorbent materials shall be readily available for use in case of spills, leaks, or ruptures Where major spills may occur, a spill containment program shall be implemented Drums and containers that cannot be moved without rupture, leakage, or spillage shall be emptied into a sound container If buried drums are suspected, ground penetrating detection systems shall be used in lieu of exploratory excavation and soil or covering materials shall be removed with caution Fire extinguishers shall be on hand and ready for use to control small fires All equipment shall be such to prevent sources of ignition Respirator airline and air supply systems shall be protected from contamination and physical damage Extraneous personnel shall not be present near the drum opening operation A suitable shield shall be placed between personnel and the drums being opened Controls for drum opening, monitoring equipment and fire suppression equipment shall be located behind the explosion resistant shield If drums are bulging, then the excess interior drum pressure shall be relieved safely by the use of remote equipment and/or appropriate shielding

4 3 CONSOLIDATE STAGE, AND/OR LOADOUT OF CONTAMINATED WASTE MATERIALS

Waste materials such as containers will be staged in one central area until it can be removed from the site The material will be loaded hydraulically or mechanically into/onto trucks With this completed, the truck will be manifested, leave the site, and proceed to an approved disposal facility

The chemical hazard would be associated with splashes, dusts and vapors from the wastes Theoretically, there would be no chemical hazards from drums unless there was a spill or leak Level C protective equipment shall be used for the loadout operation Dust control should be used if visible emissions are present Care should be exercised to prevent pinching fingers between drums and straining backs from maneuvering drums Personnel should be alert to vehicular or equipment movement

4 4 DEMOBILIZATION

With the project completed, all personnel, trailers and operational equipment will be removed from the site Physical hazards will be similar to mobilization with slips, trips, and falls, and being struck by equipment being the primary hazards Personnel must continue to employ good housekeeping practices and exercise vigilance in site operations Safety belt use in company vehicles is mandatory

5 0 PERSONAL PROTECTIVE EQUIPMENT

Work on site will be accomplished using a variety of protection levels Mobilization, site prep and general site activity, equipment teardown and demobilization will take place in Level D Sampling or dust generating activity will require that Level C or Level B protection be used Air monitoring results may require an upgrade of protection from Level D to Level C to Level B

5 1 LEVEL D

General site work will require Level D protective equipment This equipment is defined as

- Cotton or Nitrile gloves
- Work clothes
- Hearing protection (if necessary)
- Eye protection
- Steel-toed shoes/boots
- Hard hat (face shield if necessary)

5 2 LEVEL C

For loading out containerized or bulk waste, dust generating activity or if air monitoring dictates, Level C will be required, and the following equipment shall be used

- Saran coated Tyvek coveralls
- Regular Tyvek coveralls (when work with dry material takes place)
- Steel-toed shoes/boots
- Vinyl booties (equipment operators or in addition to outer boots for other personnel)
- Vinyl sample gloves (inner)
- Wizard steel mesh gloves for glass pipette use

- o PVC or Neoprene gloves (outer)
- o Silver shield gloves (middle when working with solvents or unknowns)
- o PVC acid gear or rain suits (required for work with liquids or high-pressure operations)
- o Foot/shin guards (for high-pressure washing operations
- o Hearing protection (if necessary)
- o Hard hat (face shield for high pressure washing)
- o Full-face respirator

All joints between protective garments will be sealed with vinyl duct tape

5 3 LEVEL B

For drum sampling/handling, suspicious unknown handling and waste mixing, Level B protection may be required and the following equipment will be used

- o Steel-toed safety shoes/boots
- o Saran-coated protective suits with hoods (when casual contact with liquids is anticipated)
- o 100% cotton or Nomex coveralls (inner) should be used while working with flammable solvents
- o PVC acid gear
- o Wizard steel mesh gloves for glass pipette use
- o Vinyl sample gloves (inner)
- o Silver shield gloves (middle when working with solvents or unknowns)
- o PVC or Neoprene gloves (outer)
- o Hard hats with splash shields
- o Vinyl disposable booties
- o Robar or Tingley rubber overboots

- SCBA units or EGRESS masks with 5 minute escape bottles
- Hearing protection (if necessary)

All joints between protective garments will be sealed with vinyl duct tape

6 0 DECONTAMINATION PROCEDURES

Decontamination is accomplished in order to ensure the materials which personnel may have contacted in the exclusion zone are removed in the contamination reduction zones before passing into the support zone

6 1 DECONTAMINATION OF PERSONNEL

Decontamination will follow these generalized steps in the order listed

- Outer boots will be scrubbed with a detergent water solution The boots will then be removed and stacked for drying
- Outer gloves will be cleaned and removed
- Middle gloves will be cleaned and removed
- PVC suits (if used) will be scrubbed with detergent, removed, and hung to dry
- Respirators (if used) will be removed and prepared for reuse or decontaminated
- Saran-coated or regular Tyvek suits will be discarded
- Vinyl booties will be discarded
- Sample gloves will be discarded

6 2 SUSPECTED CONTAMINATION

Any employee suspected of sustaining skin contact with contaminated material will remove all clothing, shower, and don clean clothes

6 3 PERSONAL HYGIENE

Before any eating, smoking, or drinking, personnel will wash hands, arms, neck, and face Any person entering the exclusion zone will shower at the motel prior to changing into street clothes or at day's end

6 4 OTHER DECONTAMINATION PROCEDURES

All liquids and disposable clothing will be treated as contaminated waste and disposed properly by drumming (if solid) Personnel handling contaminated waste will wear Level C protection

7 0 RESPIRATORY PROTECTION

Respiratory protection may be required to protect personnel from inhalation hazards during certain phases of this project

7 1 AIR-PURIFYING RESPIRATORS

OHM has taken extreme care in providing their employees with respirators that are workable, comfortable, and offer maximum levels of protection through their inherent construction and fit As a result of several years of study, they have selected the Mine Safety Appliances (MSA) Ultra-Twin as their primary choice in respirators For this project, the GMC-H cartridge will be used as it provides protection against organic vapors, chlorine, hydrogen chloride, sulfur dioxide, dusts, fumes, mists, radon daughters, asbestos-containing dust and mists, radionuclides Select employees who have had better fit test performances with either the American Optical "Commander" or "7-Star" will use the R-53HE cartridge and those with the Survivair 4200 full-face respirator will use the equivalent 1093 cartridge

7 2 SUPPLIED-AIR RESPIRATORS

If entry is required into an oxygen deficient atmosphere, personnel will wear Survivair 9881-02 hippack airline respirators with 5-minute egress bottles

7 3 CARTRIDGE CHANGES

All cartridges will be changed a minimum of once daily However, dusty or wet conditions may necessitate more frequent changes

7 4 INSPECTION AND CLEANING

Respirators will be checked weekly by the site safety officer and before each use by the wearer All respirators and associated equipment will be decontaminated and hygienically cleaned after each use

7 5 BREATHING AIR QUALITY

29 CFR 1910 134 states breathing air shall meet the requirement of the specification for Grade D breathing air as described in the Compressed Gas Association Specification G 7 1-1966

8 0 AIR MONITORING

Air monitoring will be conducted on this project to ensure safety of personnel The measurements obtained by these instruments are intended to indicate when the use of respirators are required, to validate the use of air-purifying respirators, to determine when supplied-air respirators are required, to alert personnel of potentially explosive conditions, and to ensure sufficient oxygen for work

8 1 HNU-PID (PHOTOIONIZATION DETECTOR)

An HNU-PID equipped with an 10 2 eV lamp will be used regularly to determine the concentrations of ionizable volatile organics This is to protect personnel and to monitor for fugitive emissions A survey should be done prior to commencing operations (daily) and while drums are being handled

8 2 MONITOX UNIT

Monitox units, direct measurement electronic devices, which will alarm at TLV concentrations for HCN and H2S, may be used to measure both work area concentrations and perimeter concentrations during bulking operations

8 3 LOWER EXPLOSIVE LIMIT/OXYGEN (LEL/02) METER

The project chemist or site safety officer will perform surveys before commencing opeations (daily) or as required with an LEL/02 meter in those areas where organic solvents exist If any area shows airborne LEL concentrations of 10 percent or greater, no work will take place until the source of the emission has been identified and control measure instituted

8 3 2 Hot Work Permit Procedure

Prior to beginning hot work involving welding, cutting, or other high heat-producing operations where flammable or combustible vapors may be present, LEL measurements must be collected The measurements and permit procedures are discussed further in Appendix B

8 4 CALIBRATION REQUIREMENTS

The HNU-PID and LEL/02 meter will be calibrated daily prior to use A separate log will be kept detailing date, time span gas or other standard, and name of person performing the calibration

9 0 GENERAL SAFETY

The site supervisor is the primary safety official for the company at the site In his absence, the general foreman becomes the primary safety official

9 1 DAILY SAFETY MEETING

A safety meeting is held daily before work commences The scope of work for the day, hazards of the work, hazards of the materials, use of respirators, decontamination, and hazardous areas of the site are discussed Periodically, general subjects such as electrical safety, defensive driving, and heat stress are discussed

9 2 CHEMICAL HAZARD INFORMATION

The information contained in the Safety Plan including the health hazard information on chemicals, will be reviewed with all employees prior to working in potentially contaminated areas This information will be immediately communicated to any new employees A copy of this information will be posted in the office trailer

9 3 EATING, DRINKING AND SMOKING

Eating, drinking, and smoking shall be permitted only in designated, posted areas or behind the decon trailer All personnel will wash hands before doing same

9 4 FLAMMABLE LIQUID STORAGE

Flammable liquid storage areas shall be established and a tape barrier erected with both "Flammable Liquid" and "No Smoking" signs prominently posted

9 5 HAZARDOUS WASTE DRUM STORAGE

An area will be designated and prominently posted for hazardous waste drum storage Full drums will promptly be sent to an authorized disposal facility

9 6 REVIEW OF SAFETY AND HEALTH PLANS

All persons (workers and visitors) entering this site will read the Safety and Health Plan Upon reading, the person must sign the form found in Appendix D which states workers have read and understand the plan and will comply with the conditions of this plan

9 7 SAFETY INSPECTION CHECK-OFF SHEET

The site safety officer will make a weekly inspection of the site using OHM's Safety Inspection Project Site Form The job site supervisor will correct any unsafe conditions found during an inspection

9 8 SAFETY AND HEALTH INSPECTIONS

A site Safety and Health Inspection may be conducted during job set-up and intermittently through the project by the Corporate or Regional Safety and Health Staff

9 9 SAFETY RE-EVALUATION

As conditions change, the site supervisor may institute more or less stringent procedures than those outlined in this plan Any reduction of safety will be implemented only after consultation with appropriate health and safety personnel at Corporate headquarters

11 0 EMERGENCY PROCEDURES

Written standard operating procedures are developed for emergency events These procedures detail appropriate actions for fire, medical, and personnel exposure events The following subsections detail specific emergency guidelines and information for this project

11 1 EMERGENCY TELEPHONE

The following emergency telephone numbers shall be prominently posted near each telephone

- o Fire Department
- o Ambulance Service
- o Police Department
- o Hospital

11 2 EMERGENCY MAP

A map showing the route to the nearest hospital will be developed and posted in the decon trailer or office trailer

11 3 EMERGENCY EQUIPMENT

In the decontamination area, an emergency equipment station will be set up and will consist of an eyewash station, first-aid kit, and 20-pound ABC fire extinguisher The eyewash units will be located near the source of potential hazard

11 4 EMERGENCY SIGNAL

The emergency signal is a continuous 30-second blast on a hand-held air horn The horn will be located in the decon trailer or office trailer In an emergency, all personnel will assemble in the support zone, be accounted for and given directions on how to proceed by the site supervisor or senior foreman present If personnel are working in the exclusion zone, they will exit through the most practical exit If the emergency warrants rapid egress from the EZ, decontamination will be accomplished in the most practical means available

11 5 "BUDDY" SYSTEM

All work in the exclusion zone will be done using the "buddy" system Prior to entering the exclusion zone, buddies will be assigned Buddies are responsible for

ensuring the safety of their respective buddies and should be aware of the potential for exposure to materials found on site and general hazards of the workplace

11 6 MEDICAL EMERGENCY

In any life-threatening situation, the safety of the individual takes precedence over all procedures designed for protection against chemical contamination at the site Because there are no known acute life-threatening effects from the concentrations expected to be found at the site (with the exception of work inside confined spaces), all responses to emergency situation will be dealt with in the most expeditious manner possible

11 6 1 Worker Procedure

The nearest workers should immediately assist any person who shows signs of medical distress or who has suffered an accident The foreman should be summoned as soon as possible If a breathing or heart problem is apparent, remove the victim's respirator and loosen the clothing around the victim's neck and chest

11 6 2 Duties of Foreman

The foreman is to immediately make voice contact with the site supervisor, SSO or project control technician to alert them of the situation He should relay the following information

- o Location of the victim
- o Nature of the emergency
- o Whether the victim is conscious or not
- o The specific conditions contributing to the emergency, if known

11 6 3 Site Supervisor Procedures

After being alerted to the occurrence of a medical emergency, the site supervisor will determine whether the stricken worker is to be assisted by the other workers or whether an EMT and/or ambulance will be summoned

11 6 4 Life-threatening Incident

If an apparent life-threatening condition exists, the foreman shall inform the site supervisor, and the supervisor will contact Seneca Works Emergency System and/or an EMT

12 0 TRAINING PROGRAM

An employee educated to the hazards of the work place is a safer worker For this reason, OHM conducts a rigorous ongoing training program for its employees

12 1 OHM EMPLOYEES

All OHM employees will have received a 40-hour training session prior to any site work or qualified by experience as required by 29 CFR 1910 120 Hazardous Waste Operations and Emergency Response and SARA Regulations Site supervisors receive an additional eight hours of training Annually all personnel will attend an 8-hour refresher training occurs

12 2 DAILY SAFETY MEETINGS

A safety meeting will be held daily before work commences The scope of work for the day, hazards of the work, hazards of the materials, use of respirators, decontamination, and hazardous areas of the site will be discussed Periodically, general subjects such as electrical safety, defensive driving, and heat stress and cold stress will be discussed

12 3 PRE-PHASE TRAINING

Before a new phase of work is begun or work in a management area of which the crews are not familiar, a training session will be held covering the chemical and physical hazards related to this particular phase/area

12 4 RECORDS

All training sessions, topics, attendance, training officer, and date of training will be recorded in a safety training log book This log book will remain at the work site until completion of the project

13 0 RESPONSIBLE AUTHORITIES

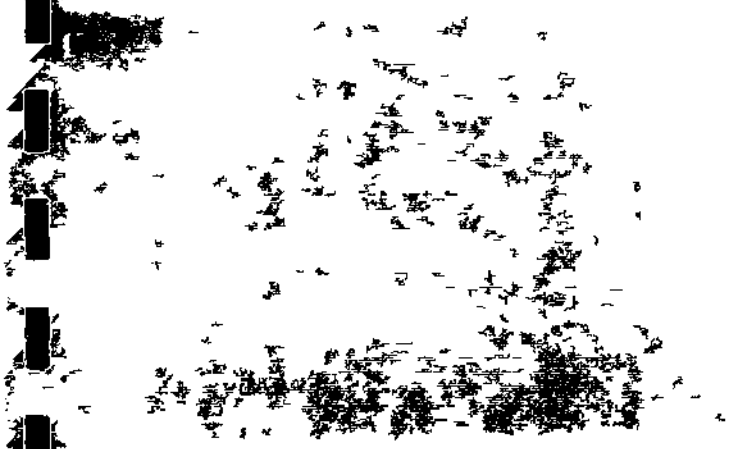
The following people share responsibility for health and safety conditions at this site

- Site Supervisor TBD
- Site Safety Officer TBD
- Project Manager Chris Srock
- Regional Safety and Health Manager James Joice (419) 423-3526
- Regional Manager Lee Hamilton (419) 423-3526
- Vice President of Health and Safety Fred Halvorsen (419) 423-3526

Additionally, as stated in the Employee Safety Guide, each employee is responsible for his own safety and the safety of his co-workers

APPENDIX A

MATERIAL SAFETY DATA SHEETS



TYPICAL OHM JOBSITE
HAZARDOUS MATERIAL INVENTORY

Acetone
Acetylene
Activated Charcoal, Powder
Alum (Aluminum Sulfate)
Anti-fog Baush & Lomb
Argon/Methane (95%/5%)
Brake Fluid
Calcium Hydroxide (Hydrated Lime)
Carbon
Caustic Soda (Sodium Hydroxide)
Citrikleen
Coal Fly Ash
Compressed Air
Diatomaceous Earth
Diesel Fuel
Dry Ice (Solid Carbon Dioxide)
Ethylene Glycol
Ferric Chloride
Freon
Gear Grease - Delta
Helium
Hexane
Hydraulic Fluid
Hydrochloric Acid
Hydrogen
Isobutylene
Kiln Dust
Methanol
Nitrogen
Nitrous Oxide
Oxygen
Penetone
Pentane
Polymers (Flocculants)
Premium Unleaded Gasoline
PVC Solvent Cleaner
PVC Cement
Regular Leaded Gasoline
Starting Fluid
Stoddard Solvent
Sulfuric Acid
10W-40 Motor Oil - Shell
Tube Grease - Kendall
TU Type 555 Thread Sealing Compound
2-Cycle Oil - Wolf's Head

DEFINITIONS

THIS DEFINITION PAGE IS INTENDED FOR USE WITH MATERIAL SAFETY DATA SHEETS SUPPLIED BY ASHLAND OIL INC AND ITS DIVISIONS RECIPIENTS OF THESE DATA SHEETS SHOULD CONSULT THE OSHA SAFETY AND HEALTH STANDARDS (29 CFR 1910) PARTICULARLY SUBPART G OCCUPATIONAL HEALTH AND ENVIRONMENTAL CONTROL AND SUBPART I PERSONAL PROTECTIVE EQUIPMENT FOR GENERAL GUIDANCE ON CONTROL OF POTENTIAL OCCUPATIONAL HEALTH AND SAFETY HAZARDS

SECTION I
PRODUCT IDENTIFICATION

GENERAL OR GENERIC ID CHEMICAL FAMILY OR PRODUCT DESCRIPTION

DOT HAZARD CLASSIFICATION PRODUCT MEETS DOT CRITERIA FOR HAZARDS LISTED

SECTION II
COMPONENTS

COMPONENTS ARE LISTED IN THIS SECTION IF THEY PRESENT A PHYSICAL OR HEALTH HAZARD AND ARE PRESENT AT OR ABOVE 1/ IN THE MIXTURE IF A COMPONENT IS IDENTIFIED AS A CARCINOGEN BY NTP IARC OR OSHA AS OF THE DATE ON THE MSDS IT WILL BE LISTED AND FOOTNOTED IN THIS SECTION WHEN PRESENT AT OR ABOVE 0 1/ IN THE PRODUCT NEGATIVE CONCLUSIONS CONCERNING CARCINOGENICITY ARE NOT REPORTED ADDITIONAL INFORMATION MAY BE FOUND IN SECTION V OTHER COMPONENTS MAY BE LISTED IF DEEMED APPROPRIATE

IDENTITIES OF COMPONENTS LISTED GENERICALLY ARE DECLARED TRADE SECRET

EXPOSURE RECOMMENDATIONS ARE FOR COMPONENTS OSHA PERMISSIBLE EXPOSURE LIMITS (PELS) AND AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH) THRESHOLD LIMIT VALUES (TLVS) APPEAR ON THE LINE WITH THE COMPONENT IDENTIFICATION OTHER RECOMMENDATIONS APPEAR AS FOOTNOTES

SECTION III
PHYSICAL DATA

BOILING POINT OF PRODUCT IF KNOWN THE LOWEST VALUE OF THE COMPONENTS IS LISTED FOR MIXTURES

VAPOR PRESSURE OF PRODUCT IF KNOWN THE HIGHEST VALUE OF THE COMPONENTS IS LISTED FOR MIXTURES

SPECIFIC VAPOR DENSITY COMPARED TO AIR = 1 IF SPECIFIC VAPOR DENSITY OF PRODUCT IS NOT KNOWN THE VALUE IS EXPRESSED AS LIGHTER OR HEAVIER THAN AIR

SPECIFIC GRAVITY COMPARED TO WATER = 1 IF SPECIFIC GRAVITY OF PRODUCT IS NOT KNOWN THE VALUE IS EXPRESSED AS LESS THAN OR GREATER THAN WATER

PH IF APPLICABLE

PERCENT VOLATILES PERCENTAGE OF MATERIAL WITH INITIAL BOILING POINT BELOW 425 DEGREES FAHRENHEIT

EVAPORATION RATE INDICATED AS FASTER OR SLOWER THAN ETHYL ETHER UNLESS OTHERWISE STATED

SECTION IV
FIRE AND EXPLOSION INFORMATION

FLASH POINT METHOD IDENTIFIED

EXPLOSION LIMITS FOR PRODUCT IF KNOWN THE LOWEST VALUE OF THE COMPONENTS IS LISTED FOR MIXTURES

HAZARDOUS DECOMPOSITION PRODUCTS KNOWN OR EXPECTED HAZARDOUS PRODUCTS RESULTING FROM HEATING BURNING OR OTHER REACTIONS

SECTION IV (CONT)

EXTINGUISHING MEDIA FOLLOWING NATIONAL FIRE PROTECTION ASSOCIATION CRITERIA

FIREFIGHTING PROCEDURES MINIMUM EQUIPMENT TO PROTECT FIREFIGHTERS FROM TOXIC PRODUCTS OF VAPORIZATION COMBUSTION OR DECOMPOSITION IN FIRE SITUATIONS OTHER FIREFIGHTING HAZARDS MAY ALSO BE INDICATED

SPECIAL FIRE AND EXPLOSION HAZARDS STATES HAZARDS NOT COVERED BY OTHER SECTIONS

NFPA CODES: HAZARD RATINGS ASSIGNED BY THE NATIONAL FIRE PROTECTION ASSOCIATION

SECTION V
HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LIMIT FOR PRODUCT

THRESHOLD LIMIT VALUE FOR PRODUCT

EFFECTS OF ACUTE OVEREXPOSURE POTENTIAL LOCAL AND SYSTEMIC EFFECTS DUE TO SINGLE OR SHORT TERM OVEREXPOSURE TO THE EYES AND SKIN OR THROUGH INHALATION OR INGESTION

EFFECTS OF CHRONIC OVEREXPOSURE POTENTIAL LOCAL AND SYSTEMIC EFFECTS DUE TO REPEATED OR LONG TERM OVEREXPOSURE TO THE EYES AND SKIN OR THROUGH INHALATION OR INGESTION

FIRST AID PROCEDURES TO BE FOLLOWED WHEN DEALING WITH ACCIDENTAL OVEREXPOSURES

PRIMARY ROUTE OF ENTRY BASED ON PROPERTIES AND EXPECTED USE

SECTION VI
REACTIVITY DATA

HAZARDOUS POLYMERIZATION CONDITIONS TO AVOID TO PREVENT HAZARDOUS POLYMERIZATION RESULTING IN A LARGE RELEASE OF ENERGY

STABILITY CONDITIONS TO AVOID TO PREVENT HAZARDOUS OR VIOLENT DECOMPOSITION

INCOMPATIBILITY MATERIALS AND CONDITIONS TO AVOID TO PREVENT HAZARDOUS REACTIONS

SECTION VII
SPILL OR LEAK PROCEDURES

REASONABLE PRECAUTIONS TO BE TAKEN AND METHODS OF CONTAINMENT CLEAN UP AND DISPOSAL CONSULT FEDERAL STATE AND LOCAL REGULATIONS FOR ACCEPTED PROCEDURES AND ANY REPORTING OR NOTIFICATION REQUIREMENTS

SECTION VIII
PROTECTIVE EQUIPMENT TO BE USED

PROTECTIVE EQUIPMENT WHICH MAY BE NEEDED WHEN HANDLING THE PRODUCT

SECTION IX
SPECIAL PRECAUTIONS OR OTHER COMMENTS

COVERS ANY RELEVANT POINTS NOT PREVIOUSLY MENTIONED

ADDITIONAL COMMENTS

CONTAINERS SHOULD BE EITHER RECONDITIONED BY CERTIFIED FIRMS OR PROPERLY DISPOSED OF BY APPROVED FIRMS DISPOSAL OF CONTAINERS SHOULD BE IN ACCORDANCE WITH APPLICABLE LAWS AND REGULATIONS EMPTY DRUMS SHOULD NOT BE GIVEN TO INDIVIDUALS SERIOUS ACCIDENTS HAVE RESULTED FROM THE MISUSE OF EMPTIED CONTAINERS (DRUMS PAILS ETC) REFER TO SECTIONS IV AND IX

RESPIRATORY PROTECTION (Specify type) Positive pressure air line with mask or self-co ta ed breathing apparatus should be available for emergency use

VENTILATION	LOCAL EXHAUST	SPECIAL
Hood with forced ventilation	To prevent accumulation above the LEL	N/A
	MECHANICAL (Ge) In accordance with electrical codes	OTHER N/A

PROTECTIVE GLOVES
PVC or rubber in laboratory as required for cutting and welding

EYE PROTECTION
Safety goggles or glasses

OTHER PROTECTIVE EQUIPMENT
Safety shoes, safety shower

SPECIAL PRECAUTIONS

SPECIAL LABELING INFORMATION
DOT Shipping Name Acetylene DOT Hazard Class Flammable gas
DOT Shipping Label Flammable gas I D No UN 1001

SPECIAL HANDLING RECOMMENDATIONS
Use only in well-ventilated areas Valve protection caps must remain in place unless container is secured with valve outlet piped to use point Do not drag, slide or roll cylinders Use a suitable hand truck for cylinder movement Use a pressure reducing regulator when removing gas from the cylinder DO NOT ALLOW THE FREE GAS TO EXCEED 30 PSIA (207 kPa) @ 70°F (21 1°C) Do not heat cylinder by any means to increase the discharge rate of product from the cylinder Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder

For additional recommendations, consult Compressed Gas Association's Pamphlets G-1 P-1, P-14 and Safety Bulletin SB-2

SPECIAL STORAGE RECOMMENDATIONS
Protect cylinders from physical damage Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits Do not allow the temperature where cylinders are stored to exceed 130F (54C) Cylinders must be stored upright and firmly secured to prevent falling or being knocked over Full and empty cylinders should be segregated Use a "first in-first out' inventory system to prevent full cylinders being stored for excessive periods of time Post "No Smoking or Open Flames signs in the storage or use area There should be no sources of ignition in the storage or use area

For additional recommendations consult Compressed Gas Association's Pamphlets G-1 P-1 P-14, and Safety Bulletin SB-2

SPECIAL PACKAGING RECOMMENDATIONS Since acetylene will explode or combust if its pressure exceeds 30 psia (207 kPa) it is shipped dissolved in acetone or dimethylformamide which is dispersed in a porous mass within the cylinder Follow your supplier's instructions for the maximum withdrawal rate for each size cylinder so that solvent is not withdrawn with the acetylene

Most metals except silver, copper, mercury or brasses with more than 66% copper are compatible (non corrosive) with acetylene

OTHER RECOMMENDATIONS OR PRECAUTIONS
Earth-ground and bond all lines and equipment associated with the acetylene system Electrical equipment should be non-sparking or explosion proof Compressed gas cylinders should not be refilled except by qualified producers of compressed gases Shipment of a compressed gas cylinder which has not been filled by the owner or with his (written) consent is a violation of Federal Law (49CFR)

FIRE AND EXPLOSION HAZARD DATA (Continued)

UEL (Continued)

Pure acetylene can ignite by decomposition above 30 psia (207 kPa) therefore the UEL is 100% if the ignition source is of sufficient intensity

FIRE AND EXPLOSION HAZARD DATA (Continued)

UNUSUAL FIRE AND EXPLOSION HAZARDS (Continued)

Acetylene has a density very similar to that of air so when leaking it does not readily dissipate

REACTIVITY DATA (Continued)

INCOMPATIBILITY (Continued)

Forms explosive acetylide compounds with copper, mercury, silver, brasses containing more than 66% copper and brazing materials containing silver or copper

FIRE AND EXPLOSION HAZARD DATA (Continued)

FLAMMABLE LIMITS % BY VOLUME (Continued)

Pure acetylene can ignite by decomposition above 30 psia (207 kPa), therefore, the UEL is 100% if the ignition source is of sufficient intensity

MATERIAL SAFETY DATA SHEET

DATE August 1985

PRODUCT NAME SERVICE ACTIVATED CARBON

CALGON CARBON CORPORATION

SECTION I

MANUFACTURER'S NAME	Calgon Carbon Corporation	EMERGENCY TELEPHONE NO	412-787-6700
ADDRESS	P O Box 717 Pittsburgh, PA 15230-0717		
CHEMICAL NAME AND SYNONYMS	Carbon	FORMULA	C

SECTION II HAZARDOUS INGREDIENTS

PRINCIPAL HAZARDOUS COMPONENT (S)	CAS #	% BY WEIGHT	ORAL LD_{50}	DERMAL LD_{50}	TLV (Units) ACGIH	OSHA	OTH
Chemical Name Carbon / Common Name Activated Carbon	7440-44-0	100%	>10g/Kg* (rat)	--	N/A	N/A	N/
Chemical Name / Common Name							
Chemical Name / Common Name							
Chemical Name / Common Name							
Chemical Name / Common Name							

*No animal mortalities during course of 14-day study

CAUTION!! Wet activated carbon removes oxygen from air causing a severe hazard to worker inside carbon vessels and enclosed or confined spaces Before entering such an area, sampling and work procedures for low oxygen levels should be taken to ensure ample oxygen availability, observing all local, state, and federal regulations

This product is non-hazardous according to the definitions for "health hazard" and "physical hazard" provided in the OSHA Hazard Communication Law (29 CFR part 1910)

SECTION III PHYSICAL DATA

BOILING POINT (°F)	N/A	SPECIFIC GRAVITY (H,O=1)	2 3g/cc real density
VAPOR PRESSURE (mmHg.)	N/A	PERCENT VOLATILE BY VOLUME (%)	N/A
VAPOR DENSITY (AIR=1)	N/A	pH	N/A
SOLUBILITY IN WATER	insoluble	OTHER packing density	0 4 to 0 7g/cc

APPEARANCE AND ODOR black particulate solid

While this information and recommendations set forth herein are believed to be accurate as of the date hereof, CALGON CARBON CORPORATION MAKES NO WARRANTY

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method Used) N/A

EXTINGUISHING MEDIA If involved in fire, flood with plenty of water

SPECIAL FIRE FIGHTING PROCEDURES None

UNUSUAL FIRE AND EXPLOSION HAZARDS Contact with strong oxidizers such as ozone, liquid oxygen, chlorine, permanganate, etc may result in fire

SECTION V HEALTH HAZARD DATA

EFFECT OF OVEREXPOSURE

A. ACUTE

1. INGESTION

The product is non-toxic through ingestion The acute oral LD_{50} (rat) is >10g/Kg

2. INHALATION

The acute inhalation LC_{50} (rat) is >64 4 mg/l (nominal concentration) for activated carbon

3. DERMAL EXPOSURE

a. TOXIC

Non-toxic

b. IRRITATION

The product is not a primary skin irritant The primary skin irritation index (rabbit) is 0

c. SENSITIZATION

None

4 EYE IRRITATION

The physical nature of the product may produce eye irritation

B. SUBCHRONIC CHRONIC OTHER

The effects of long-term, low-level exposures to this product have not been determined Safe handling of this material on a long-term basis should emphasize the avoidance of all effects from repetitive acute exposures

FIRST AID

A. EYE

Flush with plenty of water for at least 15 minutes

B. SKIN

Wash with soap and water

C. INGESTION

N/A

D. INHALATION

N/A

SECTION VI REACTIVITY DATA

ABILITY	STABLE	X	CONDITIONS TO AVOID	None
	UNSTABLE			

INCOMPATABILITY (Materials to Avoid) Strong oxidizers such as ozone, liquid oxygen, chlorine, permanganate, etc

HAZARDOUS DECOMPOSITION PRODUCTS

Carbon monoxide may be generated in the event of fire

SECTION VII SPILL OR LEAK PROCEDURES

REPORTABLE QUANTITIES (RQ) IN LBS OF EPA HAZARDOUS SUBSTANCES IN PRODUCT

1 N/A

2

3

NOTIFY EPA OF PRODUCT SPILLS EQUAL TO OR EXCEEDING N/A LBS

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Sweep up unused carbon and discard in refuse container or repackage

WASTE DISPOSAL METHOD

Dispose of unused carbon in refuse container Dispose of in accordance with local, state, and federal regulations

SECTION VIII HANDLING & STORAGE

PROTECTIVE GLOVES	EYE PROTECTION
Rubber gloves recommended	Safety glasses or goggles recommended

OTHER PROTECTIVE CLOTHING Not required

RESPIRATORY PROTECTION A NIOSH approved particulate filter respirator is recommended if excessive dust is generated

VENTILATION		
LOCAL EXHAUST	Recommended	OTHER
MECHANICAL (General)	Recommended	

STORAGE & HANDLING

CAUTION!! Wet activated carbon removes oxygen from air causing a severe hazard to workers inside carbon vessels and enclosed or confined spaces Before entering such an area, sampling and work procedures for low oxygen levels should be taken to ensure ample oxygen availability, observing all local, state, and federal regulations

OTHER PRECAUTIONS

Wash thoroughly after handling Exercise caution in the storage and handling of all chemical substances

General Chemical

PRODUCT SAFETY DATA SHEET

DRY ALUM

05

A. GENERAL INFORMATION

TRADE NAME (COMMON NAME)	☒ CAS NO ☐ GENERAL PRODUCT CODE #
ALUM (DRY)	10043 01 3 (anhydrous)

CHEMICAL NAME AND/OR SYNONYM

Aluminum Sulfate

FORMULA	MOLECULAR WEIGHT
$Al_2(SO_4)_3$ 14 H_2O (approx.)	594 (approx.)

ADDRESS (No. STREET, CITY, STATE AND ZIP CODE)

GENERAL CHEMICAL CORPORATION
CN 1829
Morristown NJ 07960-1829

CONTACT	PHONE NUMBER	LAST ISSUE DATE	CURRENT ISSUE DATE
Director Environmental Matters	(201) 455-5630		Sept. 1986

B. FIRST AID MEASURES

EMERGENCY PHONE NUMBER: (201) 455-3700

Eyes Flush immediately with water continuing for at least 15 minutes If irritation persists get medical attention

Skin Flush with plenty of soap and water removing contaminated clothing If irritation develops get medical attention

Inhalation Promptly remove to fresh air

Ingestion If conscious immediately give a large quantity of water or milk If not already vomiting induce vomiting by touching finger to back of throat Get medical evaluation

C. HAZARDS INFORMATION

HEALTH

INHALATION

Dust or mist inhalation at levels above the TLV listed below may irritate respiratory tract

INGESTION

Ingestion may irritate gastrointestinal tract LD_{50} (mouse) = approximately 10.8 g/kg (slightly toxic) – Reference (a) May cause nausea vomiting and purging Human fatal dose recorded at 30 grams (ref c)

SKIN

May cause skin irritation especially under repeated or prolonged contact or when moisture is present

EYES

May irritate or burn eyes Similarly for the aqueous solution

PERMISSIBLE CONCENTRATION AIR (SEE SECTION J)	BIOLOGICAL
TLV 2 mg Al/cu m. (ACGIH)	None

UNUSUAL CHRONIC TOXICITY

None

C. HAZARDS (Cont.)

FIRE AND EXPLOSION

FLASH POINT °C	AUTO IGNITION TEMPERATURE °C	FLAMMABLE LIMITS IN AIR (% BY VOL.)
Not flammable ☐ OPEN CUP ☐ CLOSED CUP	Not applicable	LOWER – N A UPPER – N A

UNUSUAL FIRE AND EXPLOSION HAZARDS

See Hazardous Decomposition Products Section G

D. PRECAUTIONS/PROCEDURES

FIRE EXTINGUISHING AGENTS RECOMMENDED

Not applicable.

FIRE EXTINGUISHING AGENTS TO AVOID

N.A.

SPECIAL FIRE FIGHTING PRECAUTIONS

Wear self-contained breathing apparatus approved by NIOSH

VENTILATION

Local exhaust if dusty or misty condition prevails May exceed TLV without visible indication

NORMAL HANDLING

Avoid contact with skin eyes or clothing Avoid breathing dust or mist

STORAGE

Store in a cool dry area

SPILL OR LEAK (ALWAYS WEAR PERSONAL PROTECTIVE EQUIPMENT – SECTION E)

Shovel up dry chemical and place in empty container and cover Spray residue with plenty of water Neutralize any further residue with alkali such as soda ash lime or limestone Adequate ventilation is required If soda ash or limestone is used because of the consequent release of carbon dioxide gas (See Section I for disposal methods)

SPECIAL PRECAUTIONS/PROCEDURES/LABEL INSTRUCTIONS SIGNAL WORD – WARNING!

E. PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION

Where required use a respirator approved by NIOSH for dusts or mists

EYES AND FACE

Wear hard hat (or other head covering) and chemical safety goggles Do not wear contact lenses

HANDS ARMS AND BODY

Wear gloves and full work clothing including long sleeved shirt and trousers for routine product-handling use These should be exchanged for impervious ones if handling solutions and there is repeated or prolonged contact

OTHER CLOTHING AND EQUIPMENT

Eye wash facility

F. PHYSICAL DATA

MATERIAL IS (AT NORMAL CONDITIONS)	APPEARANCE AND ODOR	
☐ LIQUID ☒ SOLID ☐ GAS ☐ _____	White or creamy white granules or powder with no odor	
BOILING POINT N A °C MELTING POINT N A °C	SPECIFIC GRAVITY (H_2O = 1) 1 61	VAPOR DENSITY (AIR = 1) N A
SOLUBILITY IN WATER (% by Weight) 50% at 0°C	pH 1% solution pH = 3 5	VAPOR PRESSURE (mm Hg at 20°C) ☐ (PSIG) ☐ Negligible
EVAPORATION RATE (Butyl Acetate = 1) ☐ (Ether = 1) ☐ N.A.	% VOLATILES BY VOLUME (At 20°C) N A.	

G. REACTIVITY DATA

STABILITY	CONDITIONS TO AVOID
☐ UNSTABLE ☒ STABLE	Temperatures above 760°C (1400°F) yield toxic and corrosive gases

INCOMPATIBILITY (MATERIALS TO AVOID)

Alkalies and water reactive materials such as oleum cause exothermic reactions

HAZARDOUS DECOMPOSITION PRODUCTS

At temperatures cited above sulfur oxide gases These are toxic and are oxidizers and corrosive The trioxide is also a fire hazard The loss of these gases leaves a caustic residue

HAZARDOUS POLYMERIZATION	CONDITIONS TO AVOID
☐ MAY OCCUR ☒ WILL NOT OCCUR	N A

H. HAZARDOUS INGREDIENTS (Mixtures Only)

MATERIAL OR COMPONENT/C A S #	WT %	HAZARD DATA (SEE SECT J)
Not Applicable		

I. ENVIRONMENTAL

DEGRADABILITY/AQUATIC TOXICITY

Aquatic Toxicity
14 ppm/36 hr/fundulus/fatal/fresh water
240 ppm/48 hr/mosquitofish/TL_m/*
*water type not specified — Reference (b)

OCTANOL/WATER PARTITION COEFFICIENT: N D

EPA HAZARDOUS SUBSTANCE (CLEAN WATER ACT SECT 311) ☒ YES ☐ NO — IF SO REPORTABLE QUANTITY 8700 # (but not regulated if less than 8700 # in one package) — 40 CFR 116 117

WASTE DISPOSAL METHODS (DISPOSER MUST COMPLY WITH FEDERAL STATE AND LOCAL DISPOSAL OR DISCHARGE LAWS)

Dissolve in water Neutralize with alkali then flush to sewer with plenty of water if permitted by applicable disposal regulations Neutralized waste may have to be disposed of by an approved contractor When using carbonates for neutralization adequate precautions should be taken to minimize hazards and pressure build-up from CO_2 gas evolution

RCRA STATUS OF UNUSED MATERIAL IF DISCARDED: Not a "hazardous waste" — HAZARDOUS WASTE NUMBER (IF APPLICABLE): — — — 40 CFR 261

J. REFERENCES

PERMISSIBLE CONCENTRATION REFERENCES

ACGIH list, "Threshold Limit Values for Chemical Substances , 1984/85

REGULATORY STANDARDS: None.

DOT CLASSIFICATION ORM E — 49 CFR 173

DOT ID No NA9078

GENERAL

(a) Stokinger H E "The Metals Chapter 29 in Patty Industrial Hygiene and Toxicology 3rd Ed 1981 Vol IIA John Wiley NYC particularly Section 15 1 for aluminum
(b) Coast Guard CHRIS system form ALM Aluminum Sulfate (18 H_2O) Oct 1978
(c) Gosselin R E , et al Clinical Toxicology of Commercial Products (Baltimore Williams & Wilkins Co 1976) page 89 Section 2

K. ADDITIONAL INFORMATION

None

PSDS FILE # GC 2001

MATERIAL SAFETY DATA SHEET

IDENTITY BAUSCH & LOMB Anti-Fog Liquid
Catalog /Order Number 24 25 66 69

SECTION 1 MANUFACTURER S NAME AND ADDRESS

Bausch & Lomb
1400 N Goodman Street
Rochester NY 14609

(800) 553-5340 MEDICAL EMERGENCY (8 AM TO 4 PM
(800) 227-4670 New York State Only Monday through Friday 8 am to 5 pm
Other Times Call the Local
Poison Control Center

(800) 553-5340 ALL OTHER QUESTIONS
(800) 227-4670 New York State Only

Date Prepared June 22 1987

SECTION 2 HAZARDOUS INGREDIENTS

Ingredient (CAS#)	%	PEL	Units	TLV	Units
Isopropanol (67-63-0)	10	400	PPM	400	PPM

SECTION 3 PHYSICAL DATA

Boiling Point (C) 100
Vapor Pressure (mm Hg) 30
Vapor Density (air = 1) Not determined
Solubility soluable in water
pH not determined
Appearance and Odor White liquid odor of rubbing alcohol

Specific Gravity 1 0
Melting Point N/A
Evaporation Rate < 1

SECTION 4 FIRE AND EXPLOSION HAZARD DATA

Flash Point (F) 105 Open Cup

Flammable Limits not determined

Extinguishing Media carbon dioxide foam class B extinguisher

Fire Fighting Procedures use self-contained breathing apparatus

Unusual Fire and Explosion Hazards None

SECTION 5 REACTIVITY DATA

Stability Stable

Incompatibility Hydrogen & Palladium Nickel Boron Oleum
Potassium-Tert-Butoxide Aluminum Aluminum Isopropoxide
Crotonaldehyde Oxidants Phosgene

Hazardous Decomposition Products CO CO2 SiO2

Hazardous Polymerization - Will Not Occur

Conditions to Avoid Sources of ignition heat open flame

SECTION 6 HEALTH HAZARD DATA

Route(s) of Entry
Inhalation irritation central nervous system depression
Skin Contact defatting dermatitis possible
Ingestion nausea vomiting headache dizziness coma possible
Eye Contact irritation

Health Hazards (Acute and Chronic)
Carcinogenicity N/A NTP N/A IARC Monographs N/A
OSHA Regulated N/A

Signs and Symptoms of Exposure N/A

Medical Conditions Generally Aggravated by Exposure None

Emergency and First Aid Procedures

Inhalation move to fresh air get medical help
Skin Contact wash with soap and water
Ingestion gastric lavage give fluids get medical help
Eye Contact flush with water for 15 minutes get medical help

SECTION 7 PRECAUTIONS FOR SAFE HANDLING AND USE

Spill Procedure remove sources of ignition absorb with vermiculite

Waste Disposal Procedure as per Local State and Federal Regulation

Spill Reporting Information (49 CFR 171 & 40 CFR 117)
Hazardous Substance None
Reportable Quantity None
Concentration of Hazardous Substance Not applicable
Reportable Quantity of Product Not applicable

Precautions to Be Taken in Handling and Storing
store in a cool dry place away from sources of ignition
keep from freezing

SECTION 8 CONTROL MEASURES

Respiratory Protection NIOSH Approved Respirator if Exposure exceeds the permissible exposure limit (PEL)

Ventilation sufficient to keep exposure below the PEL general room circulation sufficient for normal use of product

Eye and Face Protection Safety glasses and whatever is required by other occupational conditions

Protective Clothing None required for normal use of product

Work/Hygienic Practices N/A

Approved By

The above information 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

AGA

AGA Gas Inc
3300 Lakeside Avenue
Cleveland Ohio 44114

Telephone
(216) 696 2400

MATERIAL
SAFETY
DATA SHEET

PRODUCT NAME	CAS #
Electron Capture Mixture P-5	Methane = 74-82-8, Argon = 7440-37-1
TRADE NAME AND SYNONYMS	DOT I D No
Electron Capture Mixture P-5, P-5 Gas Mixture	UN 1956
CHEMICAL NAME AND SYNONYMS	DOT Hazard Class
5 Molar % Methane in Argon	Nonflammable gas
ISSUE DATE AND REVISIONS	Formula
25 November 1985	5 Molar % CH_4 in Ar
	Chemical Family
	Gas mixture

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT

No TWA is established The gas mixture is a simple asphyxiant Oxygen levels should be maintained at greater than 18 molar percent at normal (Continued on last page)

SYMPTOMS OF EXPOSURE

Effects of exposure to high concentrations so as to displace the oxygen in the air necessary for life are headache, dizziness, labored breathing and eventual unconsciousness

TOXICOLOGICAL PROPERTIES

Mixture is nontoxic, but the liberation of a large amount in a confined area could displace the amount of oxygen in air necessary to support life

RECOMMENDED FIRST AID TREATMENT

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO P-5 GAS MIXTURE RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS

Inhalation Conscious persons should be assisted to an uncontaminated area and inhale fresh air Quick removal from the contaminated area is most important Unconscious persons should be moved to an uncontaminated area, given mouth-to-mouth resuscitation and supplemental oxygen Further treatment should be symptomatic and supportive

HAZARDOUS MIXTURES OF OTHER LIQUIDS SOLIDS, OR GASES

None

PHYSICAL DATA (SEE NOTE ON LAST PAGE)

BOILING POINT	LIQUID DENSITY AT BOILING POINT
Gas mixture	Gas mixture
VAPOR PRESSURE	**GAS DENSITY AT 70 F 1 atm**
Gas mixture	Gas mixture
SOLUBILITY IN WATER	**FREEZING POINT**
Negligible	Gas mixture
EVAPORATION RATE	**SPECIFIC GRAVITY (AIR=1) @ 70°F (21 1°C) =**
Gas mixture	1 3

APPEARANCE AND ODOR

Colorless, odorless gas

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used	AUTO IGNITION TEMPERATURE	FLAMMABLE LIMITS BY VOLUME
N/A	N/A	LEL N/A UEL N/A

EXTINGUISHING MEDIA	ELECTRICAL CLASSIFICATION
N/A	Nonhazardous

SPECIAL FIRE FIGHTING PROCEDURES

N/A

UNUSUAL FIRE AND EXPLOSION HAZARDS

N/A

REACTIVITY DATA

STABILITY		CONDITIONS TO AVOID
Unstable		
Stable	X	N/A

INCOMPATIBILITY (Materials to avoid)

None

HAZARDOUS DECOMPOSITION PRODUCTS

None

HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID
May Occur		
Will Not Occur	X	N/A

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Evacuate all personnel from affected area Use appropriate protective equipment If leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs If leak is in container or container valve, contact your closest supplier location or call the emergency telephone number listed herein

WASTE DISPOSAL METHOD Do not attempt to dispose of waste or unused quantities Return in the shipping container properly labeled, with any valve outlet plugs or caps secured and valve protection cap in place to your supplier For emergency disposal assistance contact your closest supplier location or call the emergency telephone number listed herein.

RESPIRATORY PROTECTION (Specify type) Positive pressure air line with mask or self-contained breathing apparatus should be available for emergency use.		
VENTILATION	LOCAL EXHAUST (See last page)	SPECIAL N/A
See Local Exhaust	MECHANICAL (Gen) N/A	OTHER N/A
PROTECTIVE GLOVES As required		
EYE PROTECTION Safety goggles or glasses		
OTHER PROTECTIVE EQUIPMENT Safety shoes		

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION

DOT Shipping Name Compressed gas, n o s DOT Hazard Class Nonflammable gas
DOT Shipping Label Nonflammable gas I D No UN 1956

SPECIAL HANDLING RECOMMENDATIONS

Use only in well-ventilated areas Valve protection caps must remain in place unless container is secured with valve outlet piped to use point Do not drag, slide or roll cylinders Use a suitable hand truck for cylinder movement Use a pressure reducing regulator when connecting cylinder to lower pressure (<3,000 psig) piping or systems Do not heat cylinder by any means to increase the discharge rate of product from the cylinder Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder

For additional handling recommendations, consult Compressed Gas Association's Pamphlets P-1, P-14 and Safety Bulletin SB-2

SPECIAL STORAGE RECOMMENDATIONS

Protect cylinders from physical damage Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits Do not allow the temperature where cylinders are stored to exceed 130F (54C) Cylinders should be stored upright and firmly secured to prevent falling or being knocked over Full and empty cylinders should be segregated Use a "first in - first out" inventory system to prevent full cylinders being stored for excessive periods of time

For additional storage recommendations, consult Compressed Gas Association's Pamphlets P-1, P-14 and Safety Bulletin SB-2

SPECIAL PACKAGING RECOMMENDATIONS

Electron Capture Mixture P-5 is noncorrosive and may be used with any common structural material

OTHER RECOMMENDATIONS OR PRECAUTIONS

Compressed gas cylinders should not be refilled except by qualified producers of compressed gases Shipment of a compressed gas cylinder which has not been filled by the owner or with his (written) consent is a violation of Federal Law (49CFR)

HEALTH HAZARD DATA (Continued)

TIME WEIGHTED AVERAGE EXPOSURE LIMIT (Continued)

atmospheric pressure which is equivalent to a partial pressure of 135 mm Hg (ACGIH, 1985-86)

PHYSICAL DATA (Continued)

NOTE For physical data on the pure gases, see your supplier's material safety data sheets for methane and argon

SPECIAL PROTECTION INFORMATION (Continued)

LOCAL EXHAUST (Continued)

To prevent accumulation of high concentrations so as to reduce the oxygen level in the air to less than 18 molar percent

MATERIAL SAFETY DATA SHEET

FIRST BRANDS

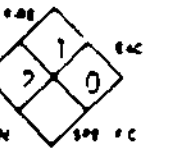
FIRST BRANDS CORPORATION
83 WOOSTER HEIGHTS ROAD
BUILDING 301
DANBURY CT 06813 1911
TELEPHONE (203) 731 2300

EMERGENCY TELEPHONE (24 HOURS)

CHEMTREC

(800) 424-9300

HAZARD RATING
4 = EXTREME
3 = HIGH
2 = MODERATE
1 = SLIGHT
0 = INSIGNIFICANT
NFPA HAZARD IDENTIFICATION



I. IDENTIFICATION

PRODUCT NAME STP® Heavy Duty Brake Fluid

TYPE: Polyglycol/glycol ether mixture STOCK # ST0925 SPEC # PS80925

FORMULA #: 6058, 6234, 6060, 435

II PHYSICAL DATA

BOILING POINT, 760 mm Hg, °F	greater than 450
FREEZING POINT °F	less than minus 40
DENSITY lbs/gal (at 68°F)	8 6
VAPOR DENSITY (Air = 1)	greater than 1
VAPOR PRESSURE mm Hg at 68°F	less than 0 1
% VOLATILES BY VOLUME	nil
SOLUBILITY IN WATER, % by Wt.	100
EVAPORATION RATE (Butyl Acetate = 1)	less than 0 1
APPEARANCE AND ODOR.	Clear, amber liquid with slight amine odor

III HAZARDOUS INGREDIENTS

MATERIAL	%	CAS #	PEL/TLV (UNITS)	(SOURCE)
Diethylene Glycol		111-46-6	50 ppm total, 10 mg/m^3 aerosol	AIHA
Polyethylene Glycol		25322-68-3	10 mg/m^3	AIHA
Polyalkylene Glycol Ethers and Corrosion Inhibitors Mixture			---None established by ACGIH or OSHA---	

None of the ingredients in this product are listed as a carcinogen (or suspected carcinogen) by IARC, NTP or OSHA.

PART OF THE INFORMATION STATED HEREIN IS BASED ON INFORMATION FROM OUR SUPPLIER(s) WHICH COULD NOT BE INDEPENDENTLY VERIFIED BY FIRST BRANDS CORPORATION EXPERTS

This sheet is directed to professional users and bulk handlers of the product

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARDS

None currently known.

EMERGENCY AND FIRST AID PROCEDURES

SWALLOWING. If a significant quantity has been swallowed, give at least 2 glasses of milk or water and induce vomiting, unless the patient is unconscious Call a physician

SKIN Wash with soap and water

INHALATION Remove to fresh air

EYES. Flush thoroughly with water for several minutes Seek medical attention if discomfort persists

NOTES TO PHYSICIAN

There is no specific antidote Treatment of overexposure should be directed at the control of symptoms and the clinical condition

VI REACTIVITY DATA

STABILITY Stable

HAZARDOUS POLYMERIZATION Will not occur

CONDITIONS TO AVOID Temperature above 300°C

INCOMPATIBILITY (Materials to Avoid) Strong oxidizing agents.

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS

Burning can produce small amounts of oxides of nitrogen

VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Wear suitable personal protective equipment Collect for disposal Larger spills may be absorbed on vermiculite or other similar material

WASTE DISPOSAL METHOD

Incineration, treatment, or landfilling should be carried out in accordance with federal, state and local regulations

XI ENVIRONMENTAL DATA

EMERGENCY PLANNING AND COMMUNITY RIGHT TO KNOW INFORMATION

This product contains the following chemicals subject to SARA TITLE III, Section 313 reporting

Chemical Name	CAS#	Weight %
Glycol Ethers	N/A	greater than 90

DATE OF ISSUE 12/19/88

P C ZAZZARO
FIRST BRANDS CORPORATION
88 Long Hill Street
East Hartford, CT 06108

Doc. #DD93s

I PRODUCT IDENTIFICATION

MANUFACTURER'S NAME DRAVO LIME COMPANY - LONGVIEW DIVISION	REGULAR TELEPHONE NO 205-664-2456 EMERGENCY TELEPHONE NO 205-663-0786
ADDRESS P O BOX 37 SAGINAW ALABAMA 35137	
TRADE NAME LONGVIEW PELICAN	
SYNONYMS CALCIUM HYDROXIDE, HYDRATED OR SLAKED LIME (Ca(OH)2)	
SHIPPING NAME[1] DOT LONGVIEW OR PELICAN HIGH CALCIUM HYDRATED LIME	
DATA NOT RESTRICTED	

II HAZARDOUS INGREDIENTS[2]

MATERIAL OR COMPONENT	CAS NO	%	HAZARD DATA
Available calcium hydroxide		95 93	See sections III
Available Lime Index		71 2	IV V VI VII VIII
Silica		62	IV
R_2O_3		52	
L O I		24 44	
MgO		1 16	

III PHYSICAL DATA

BOILING POINT 760MM HG	N A	MELTING POINT	N A
SPECIFIC GRAVITY (H_2O=1)	2 3 - 2 4	VAPOR PRESSURE	N A
VAPOR DENSITY (AIR=1)	N A	SOLUBILITY IN H_2O BY WT	negligible 0 65-0 07
VOLATILES BY VOLUME	25% max at 540°C	EVAPORATION RATE (BUTYL ACETATE)	N A
APPEARANCE AND ODOR	White powder faint Musty earthy odor	Ph (AS IS) Ph (1% SOLN)	

IV FIRE AND EXPLOSION DATA

FLASH POINT (TEST METHOD)	N A	AUTOIGNITION TEMPERATURE	N A
FLAMMABLE LIMITS IN AIR, % BY VOLUME	LOWER N A	UPPER	N A
EXTINGUISHING MEDIA	N A		
SPECIAL FIRE FIGHTING PROCEDURES	N A		
UNUSUAL FIRE AND EXPLOSION HAZARD	N A		

1 See references 1 and 2 2 See instructions and references 1 to 8

HEALTH HAZARD DATA	HAZARD CLASSIFICATION	BASIS FOR CLASSIFICATION	CR
ROUTES OF EXPOSURE INHALATION	STRONG SENSITIZER		
SKIN CONTACT	STRONG SENSITIZER		
SKIN ABSORPTION	N A		
EYE CONTACT	MILD IRRITANT		
INGESTION	NON-TOXIC GRAS APPPOVED AS FOOD ADDITIVE		
EFFECTS OF OVEREXPOSURE			
ACUTE OVEREXPOSURE	MILD IRRITANT		
CHRONIC OVEREXPOSURE	CA CAUSE EXCESSIVE DRYING OF SKIN AND POSSIBLE IRRITATION		

EMERGENCY AND FIRST AID PROCEDURES

EYES	FLUSH OUT IMMEDIATELY WITH WATER AND SEE A PHYSICIAN
SKIN	WASH OFF LIME DUST WITH CLEAN WATER RINSE SKIN WITH DILUTED VINEGAR APPLY BURN OINTMENT TO AFFECTED AREAS
INHALATION	N A
INGESTION	N A

NOTES TO PHYSICIAN

72 62 7920 01

MATERIAL SAFETY DATA SHEET

Ashland Chemical Company
DIVISION OF ASHLAND OIL, INC
P O BOX 22 9 COLUMBU OH O 43216 (614) 889 3333
24 HOUR EMERGENCY TELEPHONE (606) 324 1133

Ashland

THIS MSDS COMPLIES WITH 29 CFR 1910 1200 (THE HAZARD COMMUNICATION STANDARD)

****

PRODUCT NAME CAUSTIC SODA LIQUID 50/ INDUST
CAS NUMBER 1310 73 2

OH MATERIALS
16406 RT 224 EAST
FINDLAY OH 45840

05 50 038 657:330
DATA SHEET NO 0000721 003
LATEST REVISION DATE 10/85 85303
PRODUCT 31500000
INVOICE 655401
INVOICE DATE 10/23/85
TO OH MATERIALS
16406 RT 224 EAST
FINDLAY OH 45840

ATTN PLANT MGR /SAFETY DIR

SECTION I PRODUCT IDENTIFICATION

GENERAL OR GENERIC ID ALKALI

HAZARD CLASSIFICATION (09) CORROSIVE MATERIAL (173 240)

SECTION II HAZARDOUS COMPONENTS

INGREDIENT	% (BY WT)	PEL	TLV		NOTE
SODIUM HYDROXIDE	50	2	2	MG/M3	CEILING

SECTION III PHYSICAL DATA

PROPERTY	REFINEMENT	MEASUREMENT
INITIAL BOILING POINT	FOR PRODUCT	288 00 DEG F (142 22 DEG C) @ 760 00 MMHG
VAPOR PRESSURE	FOR PRODUCT	3 00 MMHG @ 100 00 DEG F (37 77 DEG C)
VAPOR DENSITY		HEAVIER THAN AIR
SPECIFIC GRAVITY		1 525 @ 68 00 DEG F (20 00 DEG C)
PERCENT VOLATILES		50 00/
EVAPORATION RATE		SLOWER THAN ETHER
APPEARANCE		CLEAR & COLORLESS
STATE		LIQUID
FORM		HOMOG SOLN

SECTION IV FIRE AND EXPLOSION DATA

FLASH POINT NOT APPLICABLE

EXPLOSIVE LIMIT NOT APPLICABLE

EXTINGUISHING MEDIA

HAZARDOUS DECOMPOSITION PRODUCTS NOT APPLICABLE

SPECIAL FIREFIGHTING PROCEDURES WEAR SELF CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE AND FULL BODY PROTECTIVE CLOTHING WHEN FIGHTING FIRES

UNUSUAL FIRE & EXPLOSION HAZARDS CAN REACT WITH CHEMICALLY REACTIVE METALS SUCH AS ALUMINUM ZINC MAGNESIUM COPPER ETC TO RELEASE HYDROGEN GAS WHICH CAN FORM EXPLOSIVE MIXTURES WITH AIR

NFPA CODES HEALTH- 3 FLAMMABILITY 0 REACTIVITY 1

SECTION V HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LEVEL	2	MG/M3	CEILING
THRESHOLD LIMIT VALUE	2	MG/M3	CEILING

EFFECTS OF OVEREXPOSURE FOR PRODUCT

EYES - CAUSES SEVERE DAMAGE AND EVEN BLINDNESS VERY RAPIDLY
SKIN CAUSES BURNS POSSIBLE DEEP ULCERATION
BREATHING MIST CAN CAUSE DAMAGE TO NASAL AND RESPIRATORY PASSAGES
SWALLOWING RESULTS IN SEVERE DAMAGE TO MUCOUS MEMBRANES AND DEEP TISSUES

FIRST AID

IF ON SKIN IMMEDIATELY FLUSH EXPOSED AREA WITH WATER FOR AT LEAST 15 MINUTES GET MEDICAL ATTENTION REMOVE CONTAMINATED CLOTHING LAUNDER CONTAMINATED CLOTHING BEFORE RE USE
DISCARD CONTAMINATED SHOES

CITRIKLEEN®

US PATENT 4 511 486

A BIODEGRADABLE WATER SOLUBLE SOLVENT CLEANER & DEGREASER

An Environmentally
Safe Solution
For Todays Problems
Tomorrows Ecology

Citrikleen is a solvent cleaning agent free of petroleum or chlorinated solvents provides environmental safety plus superior solvent degreasing efficiency

Outperforms many solvent solvent emulsion and alkaline cleaners for removal of heavy greases carbonized oils gear lubes grease buildups oily deposits tar even bituminous deposits while providing a safer more pleasant environment

Equally effective in soak tank (coarse) pressure spray foam on and manual cleaning methods or (outdoors) in high temperature cleaning applications

TYPICAL USES

Citrikleen can be used in almost any industrial transportation or general plant maintenance operation Diluted with water Citrikleen is most effective

For removal of heavy grease and oils on shovel sticks (cranes and diggers) trucks mill stands floors oil cellars tar pumps valves

- Carbonized oils and greases are easily removed from engines transmissions motors housings and metal parts with Citrikleen in spray foam brush or dip applications and water rinsed
- In waste treatment plants Citrikleen is used for cleaning degreasing and deodorizing lift stations wet wells and walls catwalks bar screens sump pumps scum pits and troughs transfer pipes and equipment
- For heavy duty cleaning and degreasing of industrial plant areas – from floors and walls machinery and metal parts to production equipmen trans port and mobile equipment forklift trucks and associated materials hand ling equipment metal areas

Replaces the need for vapor degreasing

DESCRIPTION

Citrikleen is a biodegradable water soluble heavy duty cleaner degrease formulated with an organic citrus based solvent and multicomponent surfactant emulsifier system to achieve superior cleaning and degreasing capabilities

It has a natural pleasant odor The absence of any hazardous petroleum hydrocarbons in Citrikleen allows disposal after soil is removed

Used in concentrated form or at various water dilution rates Citrikleen will rapidly penetrate and lift the widest range of petroleum animal and vegetable based oils fats and greases which are then easily removed by water rinsing The oily contaminants in used Citrikleen solutions left in a still tank or holding pond after cleaning will rise to the surface and separate This oil may be removed by top skimming The remaining bottom layer is biodegradable reusable liquid cleaning solution which can be easily disposed of in accordance with local state and Federal EPA regulations if no longer needed

PENETONE CORPORATION ● [illegible]
CENTRAL OFFICES [illegible]
OTHER LOCATIONS [illegible]

CITRIKLEEN®

A BIODEGRADABLE WATER SOLUBLE SOLVENT CLEANER & DEGREASER

PROPERTIES

Physical Form & Odor	clear amber liquid with the odor of ci us
pH (Concentrate)	10 4
Flash Point (Concentrate)	165° F (C O C)
(1 3 parts water)	none to boiling (212° F)
Fire Point (Concentrate)	175° F (C O C)
Freezing Point	approximately 32° F
Solubility	complete in water forms milky emulsion
Rinsability	excellent with water
Viscosity	BRK Spindle No 1 @ 60 RPM approximately 18 cps
Metal Safety	safe for use on most metals

Caution Prolonged immersion may attack certain aluminum alloys Test before using

TYPICAL USE DIRECTIONS

Surface	Problem Soils	Water Dilution Rates	Method of Application
Mill housings shovel sticks trucks mill stands floors oil cellars	Heavy grease oils carbonized deposits tar lubes	1 1 to 1 10 or undiluted	Use coarse spray foam on or apply by brush Rinse with water
Automotive parts engines housings trans missions all metal parts	Heavy grease oily deposits	1 2 to 1 20	Spray or brush on or use in a cold tank dip Rinse with water
Waste Treat ment plants wet wells & walls lift stat ions	Waste fats grease oils odor sources	1 1 to 1 5	Spray on using coarse spray under normal or lov pressure Allow 10 15 minutes dwell time Wa er rinse before surface dr es
Industrial plant flooring	Heavy greases oil rubber marks	1 10 to 1 30	Spray mop or b ush on or use power vacuum scrubber with pickup
Parts Washing	Grease oils	1 3 to 1 20	Used cold in recirculatino dip tanks Rinse with wate or dry rag wipe

*At these dilution ratios Citrikleen is exempt from permit requirements unde
*District Rule 11(d) (37) Air Pollution Control County of San Diego California

IMPORTANT Before using Citrikleen always be sure to read and follow precautions and directions for use appearing on the container label

penetone CORPORATION
A Subsidiary of West Chemical Products Inc

74 HUDSON AVENUE TENAFLY NJ 07670
EMERGENCY TEL NO 201) 567 3000

MATERIAL SAFETY DATA SHEET

(Confidential Formula – Information not to be disclosed other than medical personnel and other regulatory agencies)

DATE January 13 1988

SECTION I PRODUCT IDENTIFICATION

TRADE NAME CITRIKLEEN

FORMULA Limonene, alkyl aryl sulfonate, diethylene glycol monobutyl ether, alkyl aryl polyether, ethanolamine, EDTA type chelate, butylated hydroxytoluene, water

CHEMICAL FAMILY Liquid Cleaner

SECTION II HAZARDOUS INGREDIENTS

COMPONENT OR MATERIAL CHEMICAL NAMES	CAS NO	OSHA PEL	ACGIH TLV
Ethanolamine	141-43-5	3 PPM (6 PPM STEL)	3 PPM

SECTION III PHYSICAL DATA

BOILING POINT °F Approximately 212	VAPOR PRESSURE mm Hg 20°C (68°F Not Applicable
EVAPORATION RATE (ETHER 1) Not Determined	VAPOR DENSITY (AIR 1) @ 60 90°F Not Applicable
SOLUBILITY IN H2O by wt @ 20°C (68°F) Forms stable emulsion	VOLATILES by VOL @ 70 F Negligible
SPECIFIC GRAVITY H2O 1 75°F 0 95±	pH (10 solution) 10 0
APPEARANCE & ODOR Clear, light-yellow liquid, citrus odor	

SECTION IV FIRE AND EXPLOSION DATA

FLASH POINT (Method Used)	FLAMMABLE EXPLOSIVE LIMITS	UPPER	LOWER
165°F (C O C) 125°F (P M C C)	N D	N D	N D

EXTINGUISHING MEDIA
CO_2, dry powder, foam type

SPECIAL FIRE FIGHTING PROCEDURES
Treat as Class B (oil type) fire

UNUSUAL FIRE & EXPLOSION HAZARDS
None

SECTION V EMERGENCY AND FIRST AID PROCEDURES

EYES
Immediately flush with water for several minutes See physician immediately

SKIN
Flush with water for several minutes If irritation develops or persists, consult physicia

INHALATION
Remove to fresh air Perform artificial respiration if needed

INGESTION
Give large amounts of milk or water. Seek medical attention

SECTION VI – HEALTH HAZARD DATA

ROUTES OF ENTRY	Eyes	INHALATION	X	SKIN	X	INGESTION	X

HEALTH HAZARDS (ACUTE AND CHRONIC) Acute Corrosive to skin, eyes mouth & esophagus on contact Inhalation may cause dizziness and drowsiness and irritation to mucous membrane Chronic Ethanolamine has been linked to liver & kidney damage in animals

CARCINOGENICITY	NTP	N A	IARC MONOGRAPHS	N A	OSHA REGULATED

SIGNS AND SYMPTOMS OF EXPOSURE
Inhalation - May cause dizziness and drowsiness and irritation to mucous membrane
Inhalation of high vapor concentrations may cause dizziness & drowsiness
Skin- Redness or irritation to skin
Eyes- Irritation or stinging sensation.

MEDICAL CONDITIONS GENERALLY ACGRAVATED BY EXPOSURE: Cuts and abrasions

EMERGENCY AND FIRST AID PROCEDURES

SEE SECTION V

SECTION VII REACTIVITY DATA

CONDITIONS CONTRIBUTING TO INSTABILITY: Product is stable

INCOMPATIBILITY: Strong acids

HAZARDOUS DECOMPOSITION PRODUCTS: None known

CONDITIONS CONTRIBUTING TO POLYMERIZATION: Will not occur

SECTION VIII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED
Collect on absorbent material or mop up with water

ENVIRONMENTAL REGULATIONS: Not Applicable

WASTE DISPOSAL METHOD: Allow used emulsions to separate, skim off top oil layer and discharge bottom layer in accordance with EPA regulations

SECTION IX VENTILATION AND PERSONAL PROTECTIVE EQUIPMENT

VENTILATION REQUIREMENTS
Local exhaust recommended in confined areas

SPECIAL PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY	Maintain adequate ventilation
EYES	Splash proof goggles, if splashing is anticipated
GLOVES	Solvent resistant (rubber/neoprene)
OTHER CLOTHING & EQUIPMENT	Use goggles, apron, boots as required

SECTION X SPECIAL PRECAUTIONS INCLUDING STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING & STORAGE (Always refer to label directions when using)
Do not re-use container Dispose of container in accordance with local, state and federal EPA regulations

DOT SHIPPING CLASSIFICATION
Alkaline Corrosive Liquid, N O S. (NA 1719)

Material Safety Data Sheet
may be used to comply with
OSHA's Hazard Communication Standard
29 CFR 1910 1200 Standard must be
suited 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)
Coal Fly Ash Class F, Class C

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 American Fly Ash Company	Emergency Telephone Number 312/297-8811
Address (Number Street City State and ZIP Code) 606 Potter Road	Telephone Number for Information 312/297-8811
Des Plaines, IL 60016	Date Prepared December 22, 1987
	Signature of Preparer (optional)

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity Common Name(s))	OSHA PEL	ACGIH TLV (mg/m^3)	Other Limits Recommended	Range % (optional)
Consists primarily of the following				
Silica (SiO_2)				42-59
Alumina (Al_2O_3)		10		16-29
Iron Oxide (Fe_2O_3)		5		6-24
Calcium Oxide (CaO)		2		1-16
Magnesium Oxide (MgO)		10		1- 5
Potassium Oxide (K_2O)				1- 3

Coal fly ash is chemically inorganic, composed of primarily silica, iron, alumina oxides Class F bituminous fly ash is primarily alumino silicate glass Class C sub-bituminous fly ash is primarily calcium alumino silicate glass

* TLV's are given for total dust
** TLV is for total dust containing 20% quartz; TLV for respirable dust containing 20% quartz is 0.5 mg/m³

Section III — Physical/Chemical Characteristics

Boiling Point	N/A	Specific Gravity (H_2O = 1)	2 2-2 9
Vapor Pressure (mm Hg.)	N/A	Melting Point	N/A
Vapor Density (AIR = 1)	N/A	Evaporation Rate (Butyl Acetate = 1)	N/A

Solubility in Water ≈ 5% less for a Class F

Appearance and Odor Hygroscopic light gray to buff colored powder

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
N/A (closed cup) N/A (open cup)	N/A	N/A	N/A

Extinguishing Media
N/A

Special Fire Fighting Procedures
N/A - Hazardous polymerization will not occur

Unusual Fire and Explosion Hazards
N/A - products formed by fire or excessive heat CO_2, HO_2, SO_2

Section V — Reactivity Data

Stability	Unstable		Conditions to Avoid
	Stable	X	

Incompatibility (Materials to Avoid)
powerful oxidisers flourine, chloride trifluoride, managese trioxide, etc

Hazardous Decomposition or Byproducts
none

Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur	X	

Section VI — Health Hazard Data

Routes of Entry: Inhalation? Yes Skin? Yes - (contact) Ingestion? Yes

Health Hazards (Acute and Chronic)
Particles may irritate eyes, skin and mucous membranes of the respiratory tract

Carcinogenicity: NTP? IARC Monographs? OSHA Regulated?

Signs and Symptoms of Exposure
coughing, sore throat, irritated eyes

Medical Conditions Generally Aggravated by Exposure
Repeated over-exposure may result in respiratory tract irritation

Emergency and First Aid Procedures
Eye contact - flush thoroughly with water Skin contact - wash with soap & water
Inhalation - Remove to fresh air Material is not orally toxic

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled
Collect and dispose of spilled material using normal care to avoid excess nuisance dust

Waste Disposal Method
Dispose of waste materials as an inert solid in a landfill following all applicable Federal, State and local regulations

Precautions to Be Taken in Handling and Storing
Store fly ash in dry containers in dry area, handle fly ash as you would a finely divided dust

Other Precautions

Section VIII — Control Measures

Respiratory Protection (Specify Type)
Protective dust filter mask, such as 3M's "non-toxic particle mask #8>

Ventilation	Local Exhaust: local ventilation of dust source where possible	Special	equival -
	Mechanical (General): general exhaust system capable of maintaining levels at	Other	or below exposure limit

Protective Gloves: not needed unless dry sensitive skin is problem

Eye Protection: Wear goggles

DISCLAIMER: Safety and health information provided is believed to be accurate. It is offered as a convenience only for use in recipient's own independent verification and/or investigation and not reliance thereon otherwise. American Fly Ash Co. DISCLAIMS any express and all implied warranties including accuracy, adequacy and suitability of the information. It is intended for persons of appropriate knowledge skill and training who is choosing to apply said information with or

AGA

AGA Gas Inc
3300 Lakeside Avenue
Cleveland Ohio 44114

Telephone
(216) 696 2400

MATERIAL SAFETY DATA SHEET

PRODUCT NAME	CAS
Compressed Air	N/A
TRADE NAME AND SYNONYMS Compressed Air, Air, Compressed Air, Breathing Quality	DOT ID No UN 1002
CHEMICAL NAME AND SYNONYMS See last page	DOT Hazard Class Nonflammable gas
	Formula See last page
ISSUE DATE AND REVISIONS 25 November 1985	Chemical Family N/A

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT

None listed (ACGIH, 1985-86)

SYMPTOMS OF EXPOSURE Air is nontoxic and necessary to support life Inhalation of air in a high pressure environment such as underwater diving, caissons or hyperbaric chambers can result in symptoms similar to overexposure to pure oxygen These include tingling of fingers and toes, abnormal sensations, impaired coordination and confusion Decompression sickness pains or "bends are possible following rapid decompression

TOXICOLOGICAL PROPERTIES

High pressure effects (greater than two atmospheres of oxygen) are on the central nervous system Improper decompression results in the accumulation of nitrogen in the blood

RECOMMENDED FIRST AID TREATMENT

Facilities or practices at which air is breathed in a high pressure environment should be prepared to deal with the illnesses associated with decompression (bends or caisson disease) Decompression equipment may be required

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES

N/A

PHYSICAL DATA

BOILING POINT	LIQUID DENSITY AT BOILING POINT
-317 8°F (-194 3°C)	54 56 lb/ft^3 (874 kg/m^3)
VAPOR PRESSURE @ 70°F (21 1°C) Above the critical temp of -221 1°F (-140 6°C)	GAS DENSITY AT 70 F 1 atm 0749 lb/ft^3 (1.200 kg/m^3)
SOLUBILITY IN WATER Very slightly	FREEZING POINT N/A
EVAPORATION RATE N/A	SPECIFIC GRAVITY (AIR=1) 1 0

APPEARANCE AND ODOR
Colorless, odorless gas

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	AUTO IGNITION TEMPERATURE	FLAMMABLE LIMITS % BY VOLUME
N/A	N/A	LEL N/A UEL N/A

EXTINGUISHING MEDIA	ELECTRICAL CLASSIFICATION
Nonflammable gas	Nonhazardous

SPECIAL FIRE FIGHTING PROCEDURES

N/A

UNUSUAL FIRE AND EXPLOSION HAZARDS
Compressed air at high pressures will accelerate the burning of materials to a greater rate than they burn at atmospheric pressure

REACTIVITY DATA

STABILITY		CONDITIONS TO AVOID
Unstable		
Stable	X	N/A

INCOMPATIBILITY (Materials to Avoid)
None

HAZARDOUS DECOMPOSITION PRODUCTS
None

HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID
May Occur		
Will Not Occur	X	N/A

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

N/A

WASTE DISPOSAL METHOD

N/A

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)
N/A

VENTILATION	LOCAL EXHAUST	SPECIAL
N/A	N/A	N/A
	MECHANICAL (Gen)	OTHER
	N/A	N/A

PROTECTIVE GLOVES
Any material

EYE PROTECTION
Safety goggles or glasses

OTHER PROTECTIVE EQUIPMENT
Safety shoes

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION
DOT Shipping Name Air, compressed DOT Hazard Class Nonflammable gas
DOT Shipping Label Nonflammable gas I D No UN 1002

SPECIAL HANDLING RECOMMENDATIONS
Valve protection caps must remain in place unless container is secured with valve outlet piped to use point Do not drag, slide or roll cylinders Use a suitable hand truck for cylinder movement Use a pressure reducing regulator when connecting cylinder to lower pressure (<3,000 psig) piping or systems Do not heat cylinder by any means to increase the discharge rate of product from the cylinder Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder

For additional handling recommendations, consult the Compressed Gas Association's Pamphlets P-1, G-7 and G-7 1

SPECIAL STORAGE RECOMMENDATIONS
Protect cylinders from physical damage Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits Do not allow the temperature where cylinders are stored to exceed 130F (54C) Cylinders should be stored upright and firmly secured to prevent falling or being knocked over Full and empty cylinders should be segregated Use a "first in-first out' inventory system to prevent full cylinders being stored for excesssive periods of time

For additional storage recommendations, consult the Compressed Gas Association's Pamphlets P-1, G-7, and G-7 1

SPECIAL PACKAGING RECOMMENDATIONS

Dry air is noncorrosive and may be used with all materials of construction Moisture causes metal oxides which are formed with air to be hydrated so that they increase in volume and lose their protective role (rust formation) Concentrations of SO_2, Cl_2, salt, etc in the moisture enhances the rusting of metals in air

OTHER RECOMMENDATIONS OR PRECAUTIONS
Compressed gas cylinders should not be refilled except by qualified producers of compressed gases Shipment of a compressed gas cylinder which has not been filled by the owner or with his (written) consent is a violation of Federal Law (49CFR)

Various Government agencies have Department of Transportation Occupational Safety and Health Administration Food and Drug Administration and others may have specific regulations concerning the transportation handling storage or use of this product which will not be reflected in this data sheet The customer should review these regulations to ensure that he is in full compliance

CHEMICAL FORMULA (Continued)

Atmospheric air which is compressed is composed of the following concentrations of gases

Gas	Molar %
Nitrogen	78 09
Oxygen	20 94
Argon	0 93
Carbon Dioxide	0 033*
Neon	18 18 x 10^{-4}
Helium	5 239 x 10^{-4}
Krypton	1 139 x 10^{-4}
Hydrogen	0 5 x 10^{-4}
Xenon	0 086 x 10^{-4}
Radon	6 x 10^{-18}
Water vapor	Varying concentrations

*Concentrations may have slight variations

Compressed air is also produced by reconstitution using only oxygen and nitrogen This product contains 79 molar percent nitrogen and 21 molar percent oxygen plus trace amounts of other atmospheric gases which are present in the oxygen and nitrogen

J T BAKER MSDS
MSDS for CELITE(R) 503

1 - Site Specific Information

No SITE SPECIFIC INFORMATION has been entered for this chemical

2 - PRODUCT IDENTIFICATION

PRODUCT NAME· CELITE(R) 503
FORMULA
FORMULA WT. 00
CAS NO 68855-54-9
COMMON SYNONYMS DIATOMACEOUS EARTH, DIATOMITE, KIESELGUHR SODA ASH FLUX CALCINED
PRODUCT CODES E406

CHEMTREC # (800) 424-9300
NATIONAL RESPONSE CENTER # (800) 424-8802
J T BAKER CHEMICAL CO
222 RED SCHOOL LANE
PHILLIPSBURG, NJ 08865
24-HOUR EMERGENCY TELEPHONE -- (201) 859-2151

FFECTIVE 09/26/86
REVISION #02

PRECAUTIONARY LABELLING
BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	- 1	SLIGHT
FLAMMABILITY	- 0	NONE
REACTIVITY	- 0	NONE
CONTACT	- 1	SLIGHT

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD, 4 = EXTREME HAZARD)

ORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES, LAB COAT

PRECAUTIONARY LABEL STATEMENTS

CAUTION
CAUSES IRRITATION
DURING USE AVOID CONTACT WITH EYES, SKIN, CLOTHING WASH THOROUGHLY AFTER HANDLING WHEN NOT IN USE KEEP IN TIGHTLY CLOSED CONTAINER

- PRODUCT IDENTIFICATION (continued)

AF-T-DATA(TM) STORAGE COLOR CODE ORANGE (GENERAL STORAGE)

- HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO
DIATOMACEOUS EARTH	90-100	68855-54-9

- PHYSICAL DATA

OILING POINT N/A

MELTING POINT N/A

PECIFIC GRAVITY (H2O=1) 2 30

VAPOR PRESSURE(MM HG) N/A

VAPOR DENSITY(AIR=1) N/A

EVAPORATION RATE (BUTYL ACETATE=1) N/A

UBILITY(H2O)· SLIGHT (0 1 TO 1 %)

% VOLATILES BY VOLUME 0

PPEARANCE & ODOR WHITE TO PALE GRAY TO PALE BUFF POWDER WITHOUT AN ODOR

- FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP N/A

FLAMMABLE LIMITS UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE

TOXIC GASES PRODUCED
OXIDES OF SILICON

- HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA) 10 MG/M3 (PPM)

CARCINOGENICITY NTP NO IARC NO Z LIST NO OSHA REG NO

EFFECTS OF OVEREXPOSURE
INHALATION OF DUST MAY CAUSE IRRITATION TO UPPER RESPIRATORY TRACT
CONTACT WITH SKIN OR EYES MAY CAUSE IRRITATION
PROLONGED EXPOSURE TO EXCESSIVE CONCENTRATIONS OF DUST MAY CAUSE PULMONARY DISEASE.

TARGET ORGANS
NONE IDENTIFIED

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
INHALATION, SKIN CONTACT, EYE CONTACT

EMERGENCY AND FIRST AID PROCEDURES

INGESTION	IF SWALLOWED AND THE PERSON IS CONSCIOUS, IMMEDIATELY GIVE LARGE AMOUNTS OF WATER GET MEDICAL ATTENTION
INHALATION	IF A PERSON BREATHES IN LARGE AMOUNTS, MOVE THE EXPOSED PERSON TO FRESH AIR GET MEDICAL ATTENTION
EYE CONTACT	IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES GET MEDICAL ATTENTION
SKIN CONTACT	IMMEDIATELY WASH WITH PLENTY OF SOAP AND WATER FOR AT LEAST 15 MINUTES

- REACTIVITY DATA

STABILITY STABLE HAZARDOUS POLYMERIZATION WILL NOT OCCUR

CONDITIONS TO AVOID NONE DOCUMENTED

INCOMPATIBLES HYDROGEN FLUORIDE

DECOMPOSITION PRODUCTS OXIDES OF SILICON

8 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SUITABLE PROTECTIVE CLOTHING CAREFULLY SWEEP UP AND REMOVE

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS

9 - PROTECTIVE EQUIPMENT

VENTILATION	USE ADEQUATE GENERAL OR LOCAL EXHAUST VENTILATION TO KEEP FUME OR DUST LEVELS AS LOW AS POSSIBLE
RESPIRATORY PROTECTION	NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST IF AIRBORNE CONCENTRATION IS HIGH, USE AN APPROPRIATE RESPIRATOR OR DUST MASK
EYE/SKIN PROTECTION	SAFETY GLASSES WITH SIDESHIELDS, PROPER GLOVES ARE RECOMMENDED

- STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE ORANGE (GENERAL STORAGE)

SPECIAL PRECAUTIONS
KEEP CONTAINER TIGHTLY CLOSED SUITABLE FOR ANY GENERAL CHEMICAL STORAGE AREA.

11 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D O T.)

PROPER SHIPPING NAME CHEMICALS, N O S (NON-REGULATED)

INTERNATIONAL (I M O)

PROPER SHIPPING NAME CHEMICALS, N O S (NON-REGULATED)

11 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION (continued)

(TM) AND (R) DESIGNATE TRADEMARKS
N/A = NOT APPLICABLE OR NOT AVAILABLE

THE INFORMATION PUBLISHED IN THIS MATERIAL SAFETY DATA SHEET HAS BEEN COMPILED FROM OUR EXPERIENCE AND DATA PRESENTED IN VARIOUS TECHNICAL PUBLICATIONS IT IS THE USER'S RESPONSIBILITY TO DETERMINE THE SUITABILITY OF THIS INFORMATION FOR THE ADOPTION OF NECESSARY SAFETY PRECAUTIONS WE RESERVE THE RIGHT TO REVISE MATERIAL SAFETY DATA SHEETS PERIODICALLY AS NEW INFORMATION BECOMES AVAILABLE J T BAKER MAKES NO WARRANTY OR REPRESENTATION ABOUT THE ACCURACY OR COMPLETENESS NOR FITNESS FOR PURPOSE OF THE INFORMATION CONTAINED HERIN

DELTA GEAR 100 SERIES

Typical Inspections

ASTM No Grade	D 2161 Viscosity, SUS @ 100 F	D 1500 Color	D 92 Flash, F	D 287 Gravity, API
109	92 5	L 6 5	500	20 2
110	105	L 7 0	510	20 1
113	135	L 7 5	510	20 0

HAZARDOUS WARNING LABEL

Date
Product Trade Name Delta Sol 113
Tank Car Number
Cross Truck Loading Manifest No

WARNING!

AVOID PROLONGED BREATHING OF MIST OR SPRAY! Average exposure to airborne mist for an 8-hour workday should not exceed 5 0 milligrams mist per cubic meter of air

AVOID EYE AND SKIN CONTACT! Wear safety goggles/face shield to avoid eye contact Wear oil-impervious protective clothing If clothes become contaminated, change to clean clothing Wash thoroughly after handling with soap and warm water

FIRST AID

INHALATION If overcome by fumes, remove from exposure immediately and call a physician

SKIN Wash with soap and water until no odor remains

EYES Flush with water for at least fifteen (15) minutes See physician if complications arise

INGESTION Do NOT induce vomiting! Obtain medical assistance Small amounts that accidentally enter the mouth should be rinsed out until no taste of it remains

FIRE CONTROL

Use water spray or fog, chemical foam, dry chemical powder or carbon dioxide

SPILL OR LEAK

Add absorbent (sand, sawdust, etc) to the spill area Contain spill Advise State Environmental Protection Agency if required Put in appropriate container and dispose of according to federal, state, and local regulations

STORAGE

Store in original or equivalent container Keep closed when not in use Do not apply heat or flame to container

MOORE & MUNGER MARKETING, INC
230 LONG HILL CROSS ROAD
SHELTON CONNECTICUT 06484
203-925-4300

Material Safety Data Sheet
(Similar to Form OSHA-174)

INDEX LARCR1XX
DATE 07/20/87
SUPERSEDES NEW
Prepared & Approved by EBF

Section I

MOORE & MUNGER MARKETING and REFINING INC
230 Long Hill Cross Road
Shelton, CT 06484

MANUFACTURER X SELLER X

HMIS* RATING
Health 1
Flammability 1
Reactivity 0
Personal Protection B

INFORMATION ON HEALTH HAZARDS CALL (203) 925-4300

TRADE NAME and SYNONYMS
Delta Gear 100 Series 109, 110, 113

CAS No 64742-52-5

CHEMICAL NAME and SYNONYMS
Lubricating Oil
CHEMICAL FAMILY Petroleum Hydrocarbon

Section II - Hazardous Ingredients

PRINCIPAL HAZARDOUS COMPONENT(S)	THRESHOLD LIMIT VALUE
None Known	5 mg/m3 as mist
See Section VI (Carcinogenicity)	ACGIH 1984 85

Section III - Physical Data

For Additional Data See Tabulation Attached

The following data are approximate or typical values and should not be used for precise design purposes

BOILING POINT F	600+	% VOLATILE BY VOLUME	< 1
VAPOR PRESSURE (mmHg)	< 1	EVAPORATION RATE (BUAC=1)	< 1
VAPOR DENSITY (Air=1)	1+	SOLUBILITY IN WATER	Negligible

APPEARANCE AND ODOR Light to Dark Amber, Hydrocarbon Odor

Section IV - Fire and Explosion Hazard Data

FLASH POINT (ASTM D-92) See Attached
FLAMMABLE LIMITS LEL ND UEL ND
AUTO IGNITION ND
EXTINGUISHING MEDIA CO2, water spray or fog, foam, dry chemical
SPECIAL FIRE FIGHTING PROCEDURES Cool exposed containers with water spray Avoid breathing fumes
UNUSUAL FIRE AND EXPLOSION HAZARDS Pressure increase in over heated, closed containers Cool containers with water spray

Section V - Reactivity Data

STABILITY UNSTABLE ____ STABLE X
CONDITIONS TO AVOID Extreme heat
INCOMPATIBILITY (Materials to avoid) Strong oxidants
HAZARDOUS POLYMERIZATION WILL NOT OCCUR X MAY OCCUR ____
HAZARDOUS DECOMPOSITION PRODUCTS Partial burning produces fumes smoke and carbon monoxide

** HMIS = HAZARDOUS MATERIAL IDENTIFICATION SYSTEM developed by the National Paint and Coatings Association

JTBaker
222 Red School Lane Phillipsburg N J 08865
24 Hour Emergency Telephone (201) 859 2151
Chemtrec # (800) 424 9300
National Response Center # (800) 424 8802

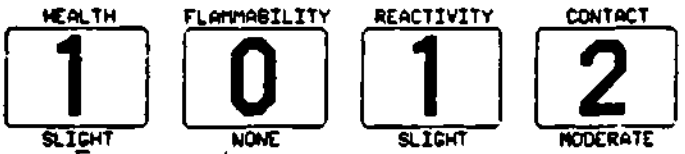
SAFETY DATA SHEET

SECTION I - PRODUCT IDENTIFICATION

Product Name	Ferric Chloride, 6-Hydrate
Formula	$FeCl_3 \cdot 6H_2O$
Formula Wt	270 30
CAS No	10025-77-1
NIOSH/RTECS No	NO5425000
Common Synonyms	Iron(III)Chloride, Hexahydrate
Product Codes	1996,2000

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA™ System



Laboratory Protective Equipment

Precautionary Label Statements

WARNING!
CAUSES IRRITATION
HARMFUL IF SWALLOWED
Avoid contact with eyes, skin, clothing
Keep in tightly closed container Wash thoroughly after handling

SECTION II - HAZARDOUS COMPONENTS

Component	%	CAS No
Ferric Chloride, 6-Hydrate	90-100	10025-77-1

SECTION III - PHYSICAL DATA

Boiling Point	280°C (536°F)	Vapor Pressure(mmHg)	N/A
Melting Point	37°C (99°F)	Vapor Density(air=1)	N/A

Continued on Page 2

SECTION III - PHYSICAL DATA (Continued)

Specific Gravity (H_2O=1) 1 82 Evaporation Rate (Butyl Acetate=1) N/A

Solubility(H_2O) Appreciable (more than 10 %) % Volatiles by Volume 0

Appearance & Odor Brownish-yellow or orange crystals with slight HCL odor

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point N/A

Flammable Limits Upper - N/A % Lower - N/A %

Fire Extinguishing Media
Use extinguishing media appropriate for surrounding fire

Special Fire-Fighting Procedures
Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece operated in positive pressure mode

Toxic Gases Produced
hydrogen chloride

SECTION V - HEALTH HAZARD DATA

Threshold Limit Value (TLV/TWA) 1 mg/m^3 (ppm)

Toxicity LD_{50} (ipr-mouse)(mg/kg) - 260

Carcinogenicity NTP No IARC No Z List No OSHA reg No

Effects of Overexposure
Inhalation of dust may cause irritation to upper respiratory tract
Contact with skin or eyes may cause severe irritation or burns
Ingestion may cause nausea, vomiting, gastrointestinal irritation, and burns to mouth and throat

Medical Conditions Generally Aggravated By Exposure
None Identified

Routes Of Entry
ingestion, inhalation, skin contact, eye contact

Emergency and First Aid Procedures
CALL A PHYSICIAN

Continued on Page 3

SECTION V - HEALTH HAZARD DATA (Continued)

If swallowed, if conscious, give large amounts of water Induce vomiting
If inhaled, remove to fresh air If not breathing, give artificial respiration If breathing is difficult, give oxygen
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes Flush skin with water

SECTION VI - REACTIVITY DATA

Stability Stable **Hazardous Polymerization** Will not occur

Conditions to Avoid moisture, light, heat

Incompatibles most common metals, water, strong bases, sodium metal, potassium metal, mineral acids

Decomposition Products hydrogen chloride

SECTION VII - SPILL AND DISPOSAL PROCEDURES

Steps to be taken in the event of a spill or discharge

Wear self-contained breathing apparatus and full protective clothing
With clean shovel, carefully place material into clean, dry container and cover, remove from area Flush spill area with water

Disposal Procedure

Dispose in accordance with all applicable federal, state, and local environmental regulations

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

Ventilation Use general or local exhaust ventilation to meet TLV requirements

Respiratory Protection Respiratory protection required if airborne concentration exceeds TLV At concentrations up to 1 mg/m^3, a dust/mist respirator is recommended If airborne concentration exceeds capacity of respirator, a self-contained breathing apparatus is advised

Eye/Skin Protection Safety glasses with sideshields, uniform, proper gloves are recommended

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA™ Storage Color Code Orange

Continued on Page 4

SECTION IX - STORAGE AND HANDLING PRECAUTIONS (Continued)

Special Precautions

Keep container tightly closed Suitable for any general chemical storage area
Store in light-resistant containers

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D O T)

Proper Shipping Name Chemicals, n o s (Non-regulated)

INTERNATIONAL (I M O)

Proper Shipping Name Chemicals, n o s (Non-regulated)

NA = Not Applicable or Not Available

The information published in this Material Safety Data Sheet has been compiled from our experience and data presented in various technical publications It is the user s responsibility to determine the suitability of this information for the adoption of necessary safety precautions We reserve the right to revise Material Safety Data Sheets periodically as new information becomes available

-- LAST PAGE --

MATERIAL SAFETY DATA SHEET

GENIUM PUBLISHING CORPORATION
1145 CATALYN STREET
SCHENECTADY NY 12303-1836 USA
(518) 377 8855

GENIUM PUBLISHING CORP

NO 323

ETHYLENE GLYCOL

REVISION B

Date November 1980

SECTION I MATERIAL IDENTIFICATION

MATERIAL NAME ETHYLENE GLYCOL
OTHER DESIGNATIONS Glycol, 1,2-Ethanediol, $HOCH_2CH_2OH$, ASTM D2693, GE Material D5B38
CAS #000 107 211
MANUFACTURER Available from many suppliers

SECTION II INGREDIENTS AND HAZARDS	%	HAZARD DATA
Ethylene glycol	ca 100	Vapor* TLV 100 ppm or 250 mg/m^3
*Current ACGIH (1980) TLV; Intended Changes List has a ceiling value for vapors at 50 ppm or 125 mg/m^3		Particulate TLV 10 mg/m^3
		Human, oral LDLo 710 mg/kg
		Human inhalation TCLo 10 g/m^3 Toxic irritant effects

SECTION III PHYSICAL DATA

Boiling point 1 atm deg F (C)	387 (197)	Specific gravity (H_2O=1)	1 12
Vapor pressure @ 20 C, mm Hg	0 06	Evaporation rate (CCl_4=1)	1
Vapor density (Air=1)	2 1	Refractive index at 25 C	1 430
Viscosity @ 35 C (95 F), cp	12 3	Freezing point, deg C	-12 7
Solubility in water @ 20 C	Complete	Molecular weight	62 08

Appearance & Odor Colorless sweet-tasting (Poisonous!) hygroscopic liquid
Practically odorless

SECTION IV FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp	Flammability Limits In Air	LOWER	UPPER
232 F (TCC) 245 F (OC)	752 F	% by Vol	3 2	15 3

Extinguishing Media CO_2, water, dry chemical or alcohol foam (especially for large fires) Cool fire-exposed containers with water Spills may be flushed and diluted with water to reduce flammability Water or foam may cause frothing
Ethylene glycol, when heated or misted into the air, becomes a moderate fire and explosion hazard
Firefighters should use self-contained breathing equipment and proper protective clothing

SECTION V REACTIVITY DATA

Ethylene glycol is a noncorrosive, stable material It is hygroscopic
Ignition in air will generate oxides of carbon and nitrogen
Lowers the freezing point of water f p at eutectic composition 60% ethylene glycol is -49 C Is miscible with water, ether, low aliphatic alcohols, aldehydes and ketones partially soluble in hydrocarbons
Mixing with chlorosulfonic acid, or oleum, or 96% sulfuric acid in a sealed container causes the temperature and pressure to increase
It is incompatible with strong oxidizing agents

NO 323

SECTION VI HEALTH HAZARD INFORMATION

TLV particulate 10 mg/m^3
vapor, 100 ppm or 250 mg/m^3

Inhalation of high ethylene glycol concentrations produces symptoms similar to ethyl alcohol intoxication pulmonary edema may also develop The single lethal oral dose for humans is about 3-4 ounces or about 1 4 ml/kg Sub-lethal ingestion can produce intoxication and coma Symptoms may include lack of appetite, spasmodic motion of the eyeball, dizziness, abdominal pain, CNS stimulation followed by depression respiratory arrest or cardiovascular collapse, acute renal failure with uremia Eye contact may cause irritation and iridocyclitis Skin absorption may also contribute to intoxication

FIRST AID

Eye Contact Wash with plenty of running water for 15 minutes

Skin Contact Rinse off with water then wash area with soap and water

Inhalation Remove victim to fresh air Restore or support breathing as required

Ingestion Give 3 glasses milk or water and induce vomiting at once! Gastric lavage recommended Support respiration

In all cases of excessive exposure get prompt medical help for further treatment, support and observation

SECTION VII SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel Provide adequate ventilation (Normal ventilation may be satisfactory if liquid is at room temperature and not misted into the air) Those handling spill emergencies should use proper protective equipment Recover as much spilled material as feasible for disposal Wash residue or small spills to the sewer with copious water

DISPOSAL Large quantities of liquids may be disposed of by mixing with more flammable solvents and atomizing into an incinerator Follow Federal State and Local regulations

Aquatic toxicity rating TLm 96 1000-100 ppm

SECTION VIII SPECIAL PROTECTION INFORMATION

When ethylene glycol is heated or agitated, or sprayed, proper exhaust hoods with 100 lfm face velocities should be used Rubber gloves should be worn to prevent skin contact Respirators should be available for nonroutine or emergency use above the TLV

Safety glasses or goggles should be worn in areas of use where splashing is possible

Eyewash stations should be available

Preemployment and annual medical exam to include kidney and liver function tests

Preclude from exposure individuals with diseases of liver kidneys lungs and central nervous system

SECTION IX SPECIAL PRECAUTIONS AND COMMENTS

Store material in mild steel, except where color requirements are most critical Then store in resin-coated steel, glass, aluminum or stainless steel containers Close containers tightly to avoid moisture Separate from oxidizing materials

Do not take internally! Poisonous! Toxic concentration of ethylene glycol are unlikely to occur at room temperature due to its unique vapor pressure Poisoning resulting from vapor usually occurs only if ethylene glycol liquid is heated Heated and agitated solutions should have proper exhaust ventilation of area to prevent inhalation liquid particles and vapors

Do not eat or drink in work areas

DATA SOURCE(S) CODE 2-11,23-25,26,34,37 39

APPROVALS MIS CRD	J M [signature]
Industrial Hygiene and Safety	[signature] 11 26 80
MEDICAL REVIEW	December 5 1980

AGA

AGA Gas Inc
6225 Oaktree Blvd
P O Box 94737
Cleveland Ohio 44101-4737

Telephone

(216) 642 6600

MATERIAL SAFETY DATA SHEET

PRODUCT NAME	CAS #
Helium	7440-59-7
TRADE NAME AND SYNONYMS	DOT I D No
Helium	UN 1046
CHEMICAL NAME AND SYNONYMS	DOT Hazard Class
Helium	Nonflammable gas
	Formula
	He
ISSUE DATE AND REVISIONS	Chem cal Fam ly
25 November 1985	Inert gas

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT Helium is defined as a simple asphyxiant Oxygen levels should be maintained at greater than 18 molar percent at normal atmospheric pressure which is equivalent to a partial pressure of 135 mm Hg (ACGIH, 1985-86).

SYMPTOMS OF EXPOSURE

Effects of exposure to high concentrations so as to displace the oxygen in the air necessary for life are headache, dizziness, labored breathing and eventual unconsciousness Breathing mixtures of helium with adequate oxygen to support life modifies the voice sound so that it is higher "pitched "

TOXICOLOGICAL PROPERTIES

Helium is nontoxic but the liberation of a large amount in a confined area could displace the amount of oxygen in air necessary to support life

RECOMMENDED FIRST AID TREATMENT

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO HELIUM RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS

Inhalation- Conscious persons should be assisted to an uncontaminated area and inhale fresh air Quick removal from the contaminated area is most important Unconscious persons should be moved to an uncontaminated area, given mouth-to-mouth resuscitation and supplemental oxygen Further treatment should be symptomatic and supportive

HAZARDOUS MIXTURES OF OTHER LIQUIDS SOLIDS OR GASES

None

PHYSICAL DATA

BOILING POINT
-452 1°F (-268 9°C)

VAPOR PRESSURE @ 70°F (21 1°C) Above the critical temp of -450 3°F (-268°C)

SOLUBILITY IN WATER
Negligible

EVAPORATION RATE
N/A

APPEARANCE AND ODOR
Colorless, odorless gas

LIQUID DENSITY AT BOILING POINT
7 8 lb/ft^3 (125 kg/m^3)

GAS DENSITY AT 70 F 1 atm
0103 lb/ft^3 (.1650 kg/m^3)

FREEZING POINT
~ point = -456.5°F (-271.3°C)

SPECIFIC GRAVITY (AIR=1) = 70°F (21 1°C) = 138

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT Method used
N/A

AUTO IGNITION TEMPERATURE
N/A

FLAMMABLE LIMITS BY VOLUME
LEL N/A UEL N/A

EXTINGUISHING MEDIA
Nonflammable, inert gas

ELECTRICAL CLASSIFICATION
Nonhazardous

SPECIAL FIRE FIGHTING PROCEDURES
N/A

UNUSUAL FIRE AND EXPLOSION HAZARDS
N/A

REACTIVITY DATA

STABILITY		CONDITIONS TO AVOID
Unstable		N/A
Stable	X	

INCOMPATIBILITY (Materials to avoid)
None

HAZARDOUS DECOMPOSITION PRODUCTS
None

HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID
May Occur		N/A
Will Not Occur	X	

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Evacuate all personnel from affected area Use appropriate protective equipment If leak is in container or container valve, contact your closest supplier location or call the emergency telephone number listed herein

WASTE DISPOSAL METHOD Do not attempt to dispose of waste or unused quantities Return in the shipping container properly labeled, with any valve outlet plugs or caps secured and valve protection cap in place to your supplier For emergency disposal assistance, contact your closest supplier location or call the emergency telephone number listed

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type) Positive pressure air line with mask or self-contained breathing apparatus should be available for emergency use.

VENTILATION	LOCAL EXHAUST	SPECIAL
See Local Exhaust on last page	See last page	N/A
	MECHANICAL (General) N/A	OTHER N/A

PROTECTIVE GLOVES
Any material

EYE PROTECTION
Safety goggles or glasses

OTHER PROTECTIVE EQUIPMENT
Safety shoes

SPECIAL PRECAUTIONS

SPECIAL LABELING INFORMATION
DOT Shipping Name Helium or Helium, Compressed DOT Hazard Class Nonflammable gas
DOT Shipping Label Nonflammable gas I D No UN 1046

SPECIAL HANDLING RECOMMENDATIONS
Use only in well-ventilated areas Valve protection caps must remain in place unless container is secured with valve outlet piped to use point Do not drag, slide or roll cylinders Use a suitable hand truck for cylinder movement Use a pressure reducing regulator when connecting cylinder to lower pressure (<3,000 psig) piping or systems Do not heat cylinder by any means to increase the discharge rate of product from the cylinder Use a check valve or trap in the discharge line to prevent hazardous back flo into the cylinder

For additional handling recommendations, consult Compressed Gas Association's Pamphlets P-1, P-9, P-14 and Safety Bulletin SB-2

SPECIAL STORAGE RECOMMENDATIONS
Protect cylinders from physical damage Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits Do not allow the temperature where cylinders are stored to exceed 130F (54C) Cylinders should be stored upright and firm secured to prevent falling or being knocked over Full and empty cylinders should be segregated Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time

For additional storage recommendations, consult Compressed Gas Association's Pamphlets P-1, P-9, P-14 and Safety Bulletin SB-2

SPECIAL PACKAGING RECOMMENDATIONS

Helium is noncorrosive and may be used with any common structural material

OTHER RECOMMENDATIONS OR PRECAUTIONS
Compressed gas cylinders should not be refilled except by qualified producers of compressed gases Shipment of a compressed gas cylinder which has not been filled by the owner or with his (written) consent is a violation of Federal Law (49CFR)

LOCAL EXHAUST (Continued)

To prevent accumulation of high concentrations so as to reduce the oxygen level in the air to less than 18 molar percent

MATERIAL SAFETY DATA SHEET (continued)

SECTION VI — REACTIVITY DATA

STABILITY	Stability limited in solution	HAZARDOUS POLYMERZATION Will not occur
INCOMPATABILITY	Acids oxidizing agents	HAZARDOUS DECOMPOSITION OF PRODUCTS
CONDITIONS TO AVOID	High temperatures Acids and oxidizing agents	High temperatures (800 900°F) may cause evolution of toxic SO_2 or H_2S gases

SECTION VII — SPILL AND DISPOSAL INFORMATION

STEPS TO BE TAKEN IN CASE OF SPILL OR LEAK Sweep up and remove excess Flush residue with water

DISPOSAL PROCEDURE

Unused in dry form HgX® may be stored indefinitely It may be disposed of according to local state and federal environmental regulations

HgX® which has been used to decontaminate a Mercury spill must be handled as follows Separate the solids and do a toxicity test on the solids and the liquid Depending upon toxicity readings more HgX® may be added to further decontaminate the liquid or solids which then should be disposed of according to local state and federal environmental regulations

SECTION VIII — SPECIAL PROTECTION INFORMATION

VENTILATION	As necessary to remove dust
EYE PROTECTION	Wear safety glasses with side shields
PROTECTIVE GLOVES/APRON	Wear clothing sufficient to protect skin from contact

SECTION IX — SPECIAL PRECAUTIONS

Store in a cool dry area Avoid storage where contact with acids or oxidizing agents is likely

Avoid breathing dust Avoid skin and eye contact

NOTICE

This data is furnished gratuitously independent of any sale of the product and only for your independent investigation and verification While this data is believed to be correct Acton makes no representation as to the accuracy of the data Acton makes no warranties guaranties or representations of any kind or nature with respect to the product or to this data either express or implied and whether arising by law or otherwise including but not limited to any implied warranty of merchantability or fitness for any particular purpose Acton shall in no event be liable for any personal injury property or other damages of any nature whatsoever whether special indirect consequential or compensatory directly or indirectly resulting from the publication or use of or reliance upon this data

MATERIAL SAFETY DATA SHEET

GENIUM PUBLISHING CORPORATION
1145 CATALYN STREET
SCHENECTADY NY 12303 1836 USA
(518) 377 8855

GENIUM PUBLISHING CORP

NO 30A

HYDROCHLORIC ACID
Revision A

DATE June 198-

SECTION I MATERIAL IDENTIFICATION

MATERIAL NAME HYDROCHLORIC ACID
DESCRIPTION This material is a water solution of hydrogen chloride gas
OTHER DESIGNATIONS Muriatic Acid Concentrated Hydrochloric Acid GE Material D4A3
CAS# 007 647 010 Aqueous Hydrochloric Acid
MANUFACTURER Available from many suppliers

SECTION II INGREDIENTS AND HAZARDS

	%	HAZARD DATA
Hydrogen Chloride (HCl)	<38	8-hr TWA 5 ppm or 7 mg/m^3 (C)*
Impurities (depends on acid grade)	Traces	
Water	Balance	
		Human Inhalation LCLo 1300ppm/30 M
		Rabbit Oral LD_{50} 900 mg/kg
		Rat Oral (20°Be) LD_{50} 700 mg/kg
		Rabbit Skin (20°Be) LD_{50} >5g/kg 24 H-C

*Current OSHA PEL and ACGIH (1983) TLV Ceiling Level

SECTION III PHYSICAL DATA

	18°Be	20°Be	22°Be	23°Be
Weight % HCl	27 9	31 5	35 2	37 1
Boiling pt 1 atm deg F	208	182	144	123
Freezing point deg F (approx)	-43	-63	-86	-101
Specific gravity 60/60 F	1 142	1 162	1 179	1 189
Vap Press 25C HCl/Total mm Hg	7/15	~25/33	~87/92	~186/190

All materials are completely water soluble with ~100/ volatiles and pH <1
Appearance & Odor Clear colorless to lt yellow fuming* liquid with a pungent irritating odor 1-5 ppm HCl detected by smell, 5-10 ppm is disagreeable
*Higher conc tend to be fuming liquids at room temperature

SECTION IV FIRE AND EXPLOSION DATA

Flash Point & Method	Auto Temp	Flammable Limits	Lower	Upper
N/A	N/A	N/A	-	-

Extinguishing media Select that suitable for surrounding fire Use a water spray to cool fire exposed containers to prevent rupture
Nonflammable but acid can react with many metals such as iron to produce flammable hydrogen gas (Flammable conc may accumulate inside metal equipment) Neutralize acid with limestone slaked lime or soda ash to minimize formation of potentially explosive hydrogen gas
Firefighters should use full protective clothing and self-contained breathing apparatus when this material is involved in a fire situation.

SECTION V REACTIVITY DATA

This material is stable when properly contained and handled It is a strong mineral acid and is thus highly reactive with materials such as metals metal oxides hydroxides amines carbonates and other alkaline materials It is highly corrosive to many materials it must have proper containment for handling and storage
It liberates significant levels of HCl gas by vapor pressure at room temperature when concentrated and large amounts of HCl when heated
Reaction with most metals will produce flammable hydrogen gas
Incompatible with materials such as cyanides sulfides sulfites and formaldehyde (may release HCN H_2S SO_2 bischloromethyl ether respectively)

SECTION VI HEALTH HAZARD INFORMATION

TLV 5 ppm Ceiling Level (as HCl)

Aqueous HCl and its vapors are strong irritants of the eyes mucous membranes and skin Severity of eye injury from splashes [from irritation to severe burns] depends on quantity conc and duration of contact Excessive acute exposure to HCl vapors/mists promptly irritates the upper respiratory tract and can result in coughing burning of the throat choking sensation and if inhaled deeply pulmonary edema Prolonged or repeated low level exposure may cause teeth erosion Skin exposure can cause burns repeated or prolonged exposure to dilute soln may cause dermatitis Ingestion can cause severe burns and possible laryngeal spasm

FIRST AID

Eye Contact Contact physician! Immediately flush with running water for 15 min including under eyelids

Skin Contact Flush affected area well with water Remove grossly contaminated clothing under safety shower Get medical help if large skin area contacted or if irritation persists

Inhalation Remove to fresh air Restore and/or support breathing as needed Use O_2 therapy for coughing difficult breathing Get medical help Keep warm and at rest

Ingestion If victim is conscious give 2-3 glasses of water then milk of magnesia or limewater Contact physician! Do not induce vomiting!

SECTION VII SPILL LEAK AND DISPOSAL PROCEDURES

Report large spills to safety personnel Evacuation may be needed, keep upwind Remove sources of ignition if H_2 is a hazard Provide optimum ventilation Those involved in clean-up of large spills must use full protective clothing boots and self-contained breathing apparatus

Small spills and residues can be covered with excess of a mixture of soda ash and slaked lime to neutralize and the slurry picked up for landfill burial or flushed with much water

Co:tain large spills Collect or flush with water to holding area for neutralization Do not flush directly to sewer or surface waters

DISPOSAL Dispose of acid via licensed contractor or neutralize with limestone soda ash or slaked lime Flushing to sewer depends on allowable neutral salt concentrations in effluent water Follow Federal, State and Local regulations Consider use of waste acid to neutralize alkaline wastes EPA (CWA) RQ is 5000 lb (40 CFR 117)

SECTION VIII SPECIAL PROTECTION INFORMATION

Provide adequate exhaust ventilation to meet TLV requirements Face velocity of hoods should exceed 100 lfm Use approved respirator or self-contained breathing apparatus for emergency or non-routine conditions with full facepiece above 50 ppm

Those handling hydrochloric acid should use protective clothing and equipment to prevent body contact with the liquid Use rubber gloves or gauntlets apron boots long sleeved shirt body suit etc Use chemical safety goggles and/or face shield for eye protection against splashing of acid

An eyewash station washing facilities and safety shower must be readily available to areas of use and handling

SECTION IX SPECIAL PRECAUTIONS AND COMMENTS

Store closed containers out of direct sunlight in a clean cool open or well-ventilated area, away from oxidizing agents away from alkaline material and sources of heat Area should have acid resistant floor and approved drainage Protect containers from physical damage Use nonsparking tools in areas around tanks and pipes where hydrogen might be generated

Use with good ventilation Avoid inhalation of HCl vapors Odor of HCl gives adequate warning for a prompt voluntary withdrawal from excessive exposure Do not get in eyes or on skin or clothing Wash thoroughly after handling

Provide emergency neutralization materials and equipment near storage and use areas

DOT Classification CORROSIVE MATERIAL I D No UN1789 Label CORROSIVE
IMO Class 8

DATA SOURCE(S) CODE 1-12 14-16 27 31 34 37 38 47-49

APPROVALS MIS/CRD	
INDUST HYGIENE/SAFETY	
MEDICAL REVIEW	15 June 1984

AGA

AGA Gas Inc
6225 Oaktree Blvd
P O Box 94737
Cleveland Ohio 44101-4737

Telephone

(216) 642 6600

MATERIAL SAFETY DATA SHEET

PRODUCT NAME Hydrogen	CAS # 1333-74-0
TRADE NAME AND SYNONYMS Hydrogen, Water Gas, Normal Hydrogen	DOT ID No UN 1049
CHEMICAL NAME AND SYNONYMS Hydrogen	DOT Hazard Class Flammable gas
ISSUE DATE AND REVISIONS 25 November 1985	Formula H_2
	Compressed Gas Family Inorganic flammable gas

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT Hydrogen is defined as a simple asphyxiant Oxygen levels should be maintained at greater than 18 molar percent at normal atmospheric pressure which is equivalent to a partial pressure of 135 mm Hg (ACGIH, 1985-86).

SYMPTOMS OF EXPOSURE

Inhalation High concentrations of hydrogen so as to exclude an adequate supply of oxygen to the lungs causes dizziness, deeper breathing due to air hunger, possible nausea and eventual unconsciousness

TOXICOLOGICAL PROPERTIES

Hydrogen is inactive biologically and essentially nontoxic, therefore, the major property is the exclusion of an adequate supply of oxygen to the lungs

RECOMMENDED FIRST AID TREATMENT

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO HYDROGEN RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND BE COGNIZANT OF EXTREME FIRE AND EXPLOSION HAZARD

Inhalation Conscious persons should be assisted to an uncontaminated area and inhale fresh air Quick removal from the contaminated area is most important Unconscious persons should be moved to an uncontaminated area, given mouth-to-mouth resuscitation and supplemental oxygen Further treatment should be symptomatic and supportive

HAZARDOUS MIXTURES OF OTHER LIQUIDS SOLIDS OR GASES

Hydrogen is flammable over a very wide range in air

PHYSICAL DATA

BOILING POINT
-423°F (-252 8°C)

LIQUID DENSITY AT BOILING POINT
4 43 lb/ft^3 (70 96 kg/m^3)

VAPOR PRESSURE @ 70°F (21 1°C) Above the critical temp of -399 8°F (-239 9°C)

GAS DENSITY AT 70°F 1 atm
0052

SOLUBILITY IN WATER
Very slightly

FREEZING POINT
-434 6°F (-259 2°C)

EVAPORATION RATE
N/A

SPECIFIC GRAVITY AIR=1 @ 70°F (21 1°C) = 069

APPEARANCE AND ODOR
Colorless, odorless gas

FIRE AND EXPLOSION HAZARD DATA

FLASH PC Method Used
Gas

AUTO IGNITION TEMPERATURE
1058°F (570°C)

FLAMMABLE LIMITS @ VOLUME
LEL 4 UEL 74 5

EXTINGUISHING MEDIA
Water, carbon dioxide, dry chemical

ELECTRICAL CLASSIFICATION
Class 1, Group B

SPECIAL FIRE FIGHTING PROCEDURES
If possible, stop the flow of hydrogen Cool surrounding containers with water spray Hydrogen burns with an almost invisible flame of relatively low thermal radiation

UNUSUAL FIRE AND EXPLOSION HAZARDS
Hydrogen is very light and rises very rapidly in air Should a hydrogen fire be extinguished and the flow of gas continue, increase ventilation to prevent an explosion

(Continued on last page)

REACTIVITY DATA

STABILITY
Stable

CONDITIONS TO AVOID
N/A

Stable

X

INCOMPATIBILITY (Materials to Avoid)
Oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS
None

HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID
May Occur		N/A
Will Not Occur	X	

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Evacuate all personnel from affected area Use appropriate protective equipment If leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs If leak is in container or container valve, contact your closest supplier location or call the emergency telephone number listed herein

WASTE DISPOSAL METHOD Do not attempt to dispose of waste or unused quantities Return in the shipping container properly labeled, with any valve outlet plugs or caps secured and valve protection cap in place to your supplier For emergency disposal assistance contact your closest supplier location or call the emergency telephone number listed herein

RESPIRATORY PROTECTION (Specify type): Positive pressure air line with mask or self-contained breathing apparatus should be available for emergency use.

VENTILATION	LOCAL EXHAUST	SPECIAL
Hood with forced ventilation	To prevent accumulation above the LEL	N/A
	MECHANICAL (General): In accordance with electrical codes	OTHER: N/A

PROTECTIVE GLOVES: Plastic or rubber

EYE PROTECTION: Safety goggles or glasses

OTHER PROTECTIVE EQUIPMENT: Safety shoes, safety shower

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION:
DOT Shipping Name: Hydrogen or Hydrogen, Compressed I D No: UN 1049
DOT Shipping Label: Flammable gas DOT Hazard Class: Flammable gas

SPECIAL HANDLING RECOMMENDATIONS:

Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<3,000 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.

For additional handling recommendations, consult Compressed Gas Association's Pamphlets G-5, P-1, P-14 and Safety Bulletin SB-2.

SPECIAL STORAGE RECOMMENDATIONS:

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 130F (54C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a first in-first out inventory system to prevent full cylinders being stored for excessive periods of time. Post No Smoking or Open Flames signs in the storage or use area. There should be no sources of ignition in the storage or use area.

(Continued on last page)

SPECIAL PACKAGING RECOMMENDATIONS:

Hydrogen is noncorrosive and may be used with any common structural material.

OTHER RECOMMENDATIONS OR PRECAUTIONS:

Earth-ground and bond all lines and equipment associated with the hydrogen system. Electrical equipment should be non-sparking or explosion proof. Compressed gas cylinders should not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with his (written) consent is a violation of Federal Law (49CFR).

UNUSUAL FIRE AND EXPLOSION HAZARDS (Continued)

hazard, particularly in the upper portions of buildings or sheds where the gas might "collect "

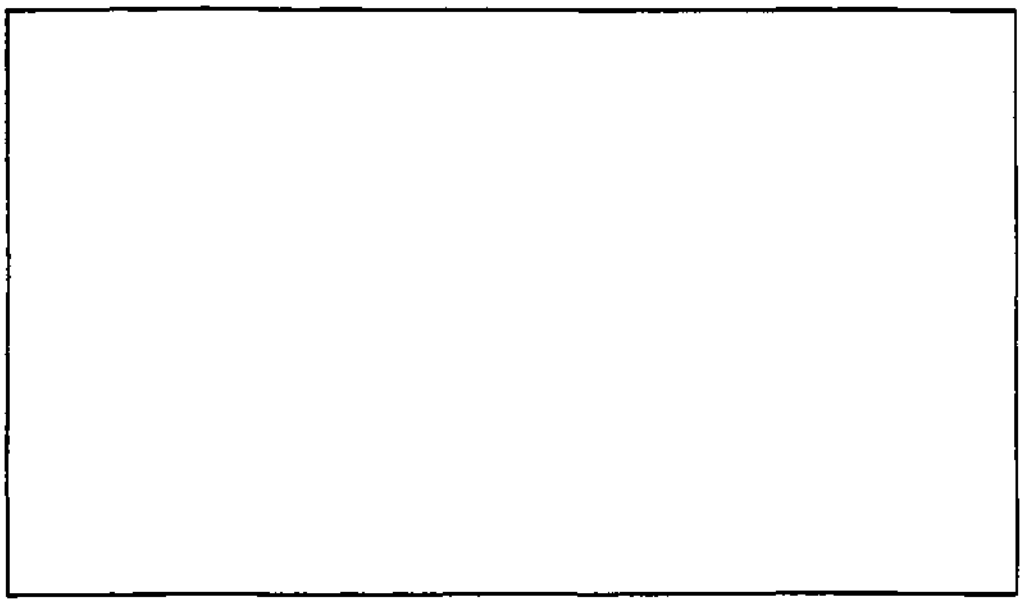
SPECIAL STORAGE RECOMMENDATIONS (Continued)

For additional storage recommendations, consult Compressed Gas Association s Pamphlets G-5, P-1, P-14 and Safety Bulletin SB-2

ATERIAL SAFETY DATA SHEET Version Jan 1990

Sigma-Aldrich Corporation
1001 West Saint Paul Ave Milwaukee, WI 53233 USA

		Sigma	Aldrich
or Emergency	Contact USA/Canada	800-325-5832	800-231-8327
	Outside USA/Canada	314-771-5765	414-273-3850



IDENTIFICATION

PRODUCT # 32946-0 NAME KEROSENE, LOW ODOR
CAS # 8008-20-6

YNONYMS

COAL OIL * COAL OIL (EXPORT SHIPMENT ONLY) (DOT) * DEOBASE * KEROSENE (DOT) * KEROSINE * KEROSINE (PETROLEUM) * STRAIGHT-RUN KEROSENE * UN 1223 (DOT) *

TOXICITY HAZARDS

RTECS NO OA5500000
KEROSENE
OXICITY DATA

ORL-MAN LDLO 500 MG/KG	YAKUD5 22,883,80
UNR-MAN LDLO 1176 MG/KG	85DCAI 2,73,70
ORL-RAT LD50 36 GM/KG	AMIHBC 2,420,50
ORL-RBT LD50 7072 MG/KG	AMIHBC 2,420,50
IPR-RBT LD50 6600 MG/KG	AIMEAS 21,803,44
IVN-RBT LD50 180 MG/KG	AIMEAS 21,803,44
ITR-RBT LD50 200 MG/KG	TXAPA9 3,689,61
ORL-GPG LD50 20 GM/KG	AIMEAS 21,803,44

EVIEWS, STANDARDS, AND REGULATIONS

IARC CANCER REVIEW ANIMAL LIMITED EVIDENCE IMEMDT 45,39,89
IARC CANCER REVIEW GROUP 2A IMEMDT 45,39,89
NIOSH REL TO KEROSENE-AIR 10H TWA 100 MG/M3 MMWR** 37(S-7),24,88
EPA TSCA CHEMICAL INVENTORY, 1986
EPA TSCA SECTION 8(E) STATUS REPORT 8EHQ-0283-0471 S,8EHQ-0283-0472S
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, SEPTEMBER 1989
RGET ORGAN DATA
BEHAVIORAL (SOMNOLENCE)
BEHAVIORAL (HALLUCINATIONS, DISTORTED PERCEPTIONS)
BEHAVIORAL (TREMOR)
BEHAVIORAL (COMA)
LUNGS, THORAX OR RESPIRATION (CHANGE IN TRACHEA OR BRONCHI)
LUNGS, THORAX OR RESPIRATION (ACUTE PULMONARY EDEMA)
LUNGS, THORAX OR RESPIRATION (RESPIRATORY STIMULATION)
ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION

---------- HEALTH HAZARD DATA ----------

CUTE EFFECTS
MAY BE HARMFUL BY INHALATION, INGESTION, OR SKIN ABSORPTION
VAPOR OR MIST IS IRRITATING TO THE EYES, MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT
CAUSES SKIN IRRITATION.
CAN CAUSE CNS DEPRESSION
TO THE BEST OF OUR KNOWLEDGE, THE CHEMICAL, PHYSICAL, AND TOXICOLOGICAL PROPERTIES HAVE NOT BEEN THOROUGHLY INVESTIGATED
FIRST AID
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES
IN CASE OF CONTACT, IMMEDIATELY WASH SKIN WITH SOAP AND COPIOUS AMOUNTS OF WATER
IF INHALED, REMOVE TO FRESH AIR IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION IF BREATHING IS DIFFICULT, GIVE OXYGEN
CALL A PHYSICIAN
WASH CONTAMINATED CLOTHING BEFORE REUSE

---------- PHYSICAL DATA ----------

BOILING PT 175 C TO 325 C
SPECIFIC GRAVITY 0 800
VAPOR DENSITY. 4.5
VAPOR PRESSURE .23 MM @ 20 C
APPEARANCE AND ODOR
COLORLESS LIQUID

---------- FIRE AND EXPLOSION HAZARD DATA ----------

FLASHPOINT 179 F BY
AUTOIGNITION TEMPERATURE· 442 F
LOWER EXPLOSION LEVEL .7%
UPPER EXPLOSION LEVEL 5%
EXTINGUISHING MEDIA
CARBON DIOXIDE, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM
PECIAL FIREFIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES
COMBUSTIBLE LIQUID.
UNUSUAL FIRE AND EXPLOSIONS HAZARDS
VAPOR MAY TRAVEL CONSIDERABLE DISTANCE TO SOURCE OF IGNITION AND FLASH BACK.

EMITS TOXIC FUMES UNDER FIRE CONDITIONS

---------- REACTIVITY DATA ----------

INCOMPATIBILITIES

STRONG OXIDIZING AGENTS
STRONG BASES
STRONG ACIDS
AMINES

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS

TOXIC FUMES OF
CARBON MONOXIDE, CARBON DIOXIDE

---------- SPILL OR LEAK PROCEDURES ----------

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

EVACUATE AREA
SHUT OFF ALL SOURCES OF IGNITION
WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.
COVER WITH DRY-LIME, SAND, OR SODA ASH PLACE IN COVERED CONTAINERS USING NON-SPARKING TOOLS AND TRANSPORT OUTDOORS
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE

WASTE DISPOSAL METHOD

THIS COMBUSTIBLE MATERIAL MAY BE BURNED IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER
OBSERVE ALL FEDERAL, STATE, AND LOCAL LAWS

--- PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE ---

WEAR APPROPRIATE NIOSH/MSHA-APPROVED RESPIRATOR, CHEMICAL-RESISTANT GLOVES, SAFETY GOGGLES, OTHER PROTECTIVE CLOTHING
SAFETY SHOWER AND EYE BATH
MECHANICAL EXHAUST REQUIRED
USE NONSPARKING TOOLS
DO NOT BREATHE VAPOR
AVOID CONTACT WITH EYES, SKIN AND CLOTHING
AVOID PROLONGED OR REPEATED EXPOSURE
WASH THOROUGHLY AFTER HANDLING
IRRITANT
HARMFUL VAPOR
KEEP TIGHTLY CLOSED
KEEP AWAY FROM HEAT AND OPEN FLAME
STORE IN A COOL DRY PLACE

Material Safety Data Sheet

From Genium's Reference Collection
Genium Publishing Corporation
1145 Catalyn Street
Schenectady NY 12303 1836 USA
(518) 377 8855

GENIUM PUBLISHING CORP

No 61
NITROGEN
(Revision A)

Issued April 1980
Revised April 1986

SECTION 1 MATERIAL IDENTIFICATION

21

MATERIAL NAME NITROGEN

DESCRIPTION Gas supplied in cylinders (2000+ psig) or cold liquid supplied in vented Dewar containers.

OTHER DESIGNATIONS N_2, CAS #7727 37 9 ASTM #D1933

MANUFACTURER/SUPPLIER Available from several suppliers, including
Air Products & Chemicals, Inc., Industrial Gas Division, PO Box 538
Allentown, PA 18105 Telephone (215) 481-4911
Airco Industrial Gases of the Boc Group Inc., 575 Mountain Avenue,
Murray Hill, NJ 07974 Telephone (201) 464-81000
Union Carbide Corp., Linde Div., 39 Old Ridgebury Rd., Danbury CT 06817 Telephone (203) 794-5300

HMIS
H 2
F 0
R 0
PPE*
*See Sect 8

(Liquified)
R 1
I 1
S 2 (Liquid)
K 0

SECTION 2. INGREDIENTS AND HAZARDS

	%	HAZARD DATA
Nitrogen, CAS #7727 37 9	>99.5	No TLV Established
Oxygen, CAS # 7782-44-7	< 0.5	

SECTION 3 PHYSICAL DATA

Boiling Point, 760 mm Hg 320 4 F (195.8 C)
Vapor Density (Air = 1) 0 967
Solubility in Water @ 20 C, Vols/100 vols ... 1.6
Density (liq) g/cm^3 .. 0 8
Melting Point _ 345 7F (209.86 C)

Critical Temperature _ 232 8 F (147 1 C)
Critical Pressure, Atm 33.5
Molecular Weight 28 01
Expansion Ratio Liquid to Gas @ 70 F 1 696

Appearance and odor A colorless, odorless, tasteless gas or a cryogenic liquid.

SECTION 4 FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp	Flammability Limits in Air	LOWER	UPPER
Not Found	Not Found	Nonflammable	Not Found	Not Found

Use extinguishing media that are appropriate to the surrounding fire Do not discharge solid streams of water into liquid N_2 Use water spray to cool fire-exposed containers or if desirable, to increase the rate of evaporation of the liquid if the increased rate can be controlled (cryogenic liquid will rapidly freeze water) Nitrogen is a nonflammable material that will not support combustion. It presents no unusual explosion hazard unless the compressed gas is exposed to fire then containers may rupture violently Nitrogen cylinders are equipped with pressure-relief devices that are designed to vent N_2 when they are exposed to elevated temperatures and pressures When liquid nitrogen is spilled it can release a rapidly vaporizing cloud that will create an oxygen-deficient atmosphere

SECTION 5 REACTIVITY DATA

Nitrogen is stable when stored in closed containers It does not polymerize Nitrogen is noncorrosive and is nearly inert at room temperature At high temperatures it can combine with oxygen to form oxides, and with hydrogen to form ammonia. When heated with carbon in the presence of alkalies or barium oxide it may form cyanides It can form nitrides with lithium, silicon, calcium, strontium, and barium when it is at a red heat.
It has been reported that nitrogen can be oxidized explosively by ozone
Lithium and titanium at an elevated temperature can burn in a nitrogen atmosphere Beryllium can be ignited in a mixed nitrogen-and-carbon dioxide atmosphere
Nitrogen will react with oxygen in the presence of sparking (from an electric arc or a gas fired furnace) to produce nitric oxide gas

SECTION 6 HEALTH HAZARD INFORMATION

Nitrogen is not listed as a carcinogen by the NTP IARC or OSHA
This material is nontoxic and is classified as a simple asphyxiant by virtue of its displacement of oxygen Symptoms of exposure depend on the degree and the duration of oxygen deficiency They can include increased frequency and volume of breathing increased pulse rate, muscular incoordination, fatigue nausea, vomiting and collapse Inhalation of pure nitrogen atmosphere produces immediate loss of consciousness death follows unless air/oxygen breathing can be quickly restored Contact with liquid nitrogen or cold vapors can cause cryogenic burns (severe frostbite/freeze burns)
FIRST AID CONTACT WITH LIQUID NITROGEN Promptly flush areas affected with lots of tepid water to reduce freezing of tissue (Do not apply direct heat to affected areas!) Do not rub frozen areas Loosely apply dry sterile bulky dressings to protect area from infection and from further injury Get medical help *
INHALATION Caution! Would be rescuers need to be concerned with their own safety in oxygen-deficient areas Use self contained breathing equipment Remove victim to fresh air Quickly restore and/or support his breathing as required, administering oxygen if available Get medical help *
INGESTION Get medical help * ACUTE EFFECTS Gas Simple asphyxiation by displacement of oxygen Liquid Cryogenic burns PRIMARY ENTRY Inhalation
* GET MEDICAL ASSISTANCE = In plant, paramedic community Get medical help for further treatment, observation and support after first aid.

SECTION 7 SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel of major nitrogen leaks or spills Shut off leak if you can do so without risk. Evacuate all personnel from the danger area until ventilation can restore a safe oxygen level Emergency personnel need self-contained breathing equipment. Minor leaks (which are dangerous in enclosed areas) can be detected by painting the suspected area of leakage with a soap solution. Prevent liquid nitrogen from contacting vulnerable steel structures and vehicle tires (see sect. 9) Allow spilled liquid to evaporate

DISPOSAL Remove a liquid nitrogen container or leaking cylinder outdoors or place into a hood with good forced ventilation Allow gas to discharge at a moderate rate Defective cylinders should be tagged to indicate defect. Close the valve and return the defective cylinder to supplier

SECTION 8 SPECIAL PROTECTION INFORMATION

Provide adequate general and local exhaust ventilation to prevent workplace atmospheres from becoming oxygen deficient (minimum O_2 volume = 18%) Provide air supplied or self-contained breathing equipment for emergency or nonroutine situations where the nitrogen level is excessive Use a safety line and a standby worker when respirator protected personnel enter a hazardously nitrogen-enriched area. (The standby worker should have a self-contained breathing apparatus immediately available) Those working with liquid nitrogen should wear approved insulating gloves safety glasses, and other protective clothing as required by use conditions to prevent any skin contact with liquid nitrogen Cuffless trousers should be worn outside high topped shoes Safety shoes are recommended for those handling cylinders of gases

Wear safety gloves and approved insulated gloves. Use air supplied or self-contained breathing apparatus

Contact lenses pose a special hazard soft lenses may absorb irritants, and all lenses concentrate them.

SECTION 9 SPECIAL PRECAUTIONS AND COMMENTS

STORAGE SEGREGATION Store in a cool, dry well ventilated low fire risk area. Protect containers against physical damage
SPECIAL HANDLING/STORAGE Protect containers from extremes of temperature and weather (Do not allow any part of a compressed gas cylinder to be exposed to temperatures above 125 F [51 6 C]) Follow general safety procedures for handling and securing compressed gas cylinders Liquid nitrogen storage areas should be kept clean and free from flammable materials Make sure that liquid nitrogen containers are properly vented to prevent buildup of pressure All pressure equipment and process lines should be designed so that the minimum burst pressure is at least four (4) times the expected maximum pressure Certain materials are unsuitable for service in contact with liquid nitrogen because they become extremely brittle and can be readily shattered by impact.
DOT Classification Nonflammable Gas UN1066 (Compressed) UN1977 (Cryogenic Liquid)
LABEL Nonflammable Gas
Data Source(s) Code 1, 4-11, 14, 17, 25, 51, 63, 82, 84 CK

Approvals [signature] 1/87
Indust Hygiene/Safety [signature] 12-86
Medical Review [signature]

Material Safety Data Sheet

From Genium s Reference Collection
Genium Publishing Corporation
1145 Catalyn Street
Schenectady NY 12303 1836 USA
(518) 377-8855

GENIUM PUBLISHING CORP

No 109

NITROUS OXIDE
(Revision A)
Issued October 1982
Revised April 1988

SECTION 1 MATERIAL IDENTIFICATION 25

Material Name NITROUS OXIDE*

Description (Origin/Uses) Used as an oxidizing agent used in aerosol whipped creams in rocket fuels with carbon disulfide administered to humans as an anesthetic and analgesic

Other Designations Dinitrogen Monoxide Laughing Gas Nitrogen Monoxide N_2O
NIOSH *RTECS* No QX1350000 CAS No 10024 97 2

Manufacturer Contact your supplier or distributor Consult the latest edition of the *Chemicalweek Buyers Guide* (Genium ref 73) for a list of suppliers

*Do not confuse this material with *nitric oxide* (Genium Industrial MSDS 227)

Not Found

HMIS			
H	0		
F	0	R	1
R	1	I	3
PPG*		S	1
*See sect 8		K	0

SECTION 2 INGREDIENTS AND HAZARDS

	%	EXPOSURE LIMITS
Nitrous Oxide, CAS No 10024 97 2	ca 100	**NIOSH REL*** TWA 25 ppm **Toxicity Data**** Human Inhalation TD_{Lo} 24 mg/kg (2 Hrs) Rat, Inhalation LC_{50} 1068 mg/m³ (4 Hrs)

*NIOSH set this REL because of reproductive and audiovisual concerns (*Criteria Document-Occupational Exposure to Waste Anesthetic Gases and Vapors* May 1977)
**See NIOSH *RTECS* for additional data with references to reproductive and mutagenic effects

SECTION 3 PHYSICAL DATA

Boiling Point -126°F (88 C)
Melting Point -132°F (91 C)
Vapor Pressure >760 Torrs (Normal Atmospheric Pressure)

Molecular Weight 44 Grams/Mole
Vapor Density (Air = 1) 1.53

Appearance and Odor A colorless gas shipped as a compressed gas or a refrigerated liquid slightly sweet odor and taste

SECTION 4 FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temperature	Flammability Limits in Air % by Volume	LOWER	UPPER
*	*		*	*

Extinguishing Media *Nitrous oxide is a nonflammable gas Use agents that will extinguish the surrounding fire If this material is involved in a fire try to stop the flow of gas Use a water spray to protect persons attempting to do this and to cool fire-exposed containers

Unusual Fire or Explosion Hazards When heated nitrous oxide increases the flammability of the other materials involved in the fire Remove cylinders containing nitrous oxide to a safe location if possible otherwise cool nitrous oxide cylinders storage tanks pipes and additional vessels with a direct water spray to prevent the explosive release of nitrous oxide

Special Fire fighting Procedures Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure demand or positive pressure mode

SECTION 5 REACTIVITY DATA

Nitrous oxide is stable in closed pressurized containers at room temperature under normal storage and handling conditions It does not undergo hazardous polymerization

Chemical Incompatibilities Aluminum, boron hydrazine lithium hydride phenyl lithium, phosphine sodium, and tungsten carbide (see Genium ref 84 p 491M 144)

Conditions to Avoid Avoid direct exposure to incompatible chemicals reducing agents and combustibles like oils

Hazardous Products of Decomposition When heated to decomposition nitrous oxide emits toxic gases such as carbon monoxide (CO) and/or oxides of nitrogen (NO_x)

Em F5

AGA

MATERIAL
SAFETY
DATA SHEET

AGA Gas Inc
6225 Oaktree Blvd
P O Box 94737
Cleveland Ohio 44101-4737

Telephone
(216) 642 6600

PRODUCT NAME	CAS
Oxygen	7782-44-7
TRADE NAME AND SYNONYMS	DOT I D No
Oxygen	UN 1072
CHEMICAL NAME AND SYNONYMS	DOT Hazard Class
Oxygen	Nonflammable gas
ISSUE DATE AND REVISIONS	Fo mula
25 November 1985	O_2
	Chem cal Fam
	Oxidizer

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT
None established (ACGIH, 1985-86) Oxygen is the 'vital element' in the atmosphere in which we live and breathe (approximately 21 molar of the atmosphere)

SYMPTOMS OF EXPOSURE
Breathing high concentrations (greater than 75 molar percent) causes symptoms of hyperoxia which include cramps, nausea, dizziness, hypothermia, ambylopia, respiratory difficulties, bradycardia, fainting spells, and convulsions capable of leading to death For additional information on hyperoxia, see Compressed Gas Association's Pamphlet P-14

TOXICOLOGICAL PROPERTIES

The property is that of hyperoxia which leads to pneumonia Concentrations between 25 and 75 molar percent present a risk of inflammation of organic matter in the body

RECOMMENDED FIRST AID TREATMENT
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO OXYGEN RESCUE PERSONNEL SHOULD BE COGNIZANT OF EXTREME FIRE HAZARD ASSOCIATED WITH OXYGEN-RICH ATMOSPHERES

Conscious persons should be assisted to an uncontaminated area and breathe fresh air They should be kept warm and quiet The physician should be informed that the victim is experiencing (has experienced) hyperoxia

Unconscious persons should be moved to an uncontaminated area and given assisted respiration When breathing has been restored, treatment should be as above Continued treatment should be symptomatic and supportive

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION Specify type
N/A

VENTILATION
To prevent accumulation above 25 molar percent

LOCAL EXHAUST To prevent accumulation above 25 molar percent

SPECIAL N/A

MECHANICAL General N/A

OTHER N/A

PROTECTIVE GLOVES
As required, any material

EYE PROTECTION
Safety goggles or glasses

OTHER PROTECTIVE EQUIPMENT
Safety shoes, safety shower

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION
DOT Shipping Name Oxygen or Oxygen, compressed DOT Hazard Class Nonflammable gas
DOT Shipping Label Oxidizer I D No UN 1072

SPECIAL HANDLING RECOMMENDATIONS

Use only in well-ventilated areas Valve protection caps and valve outlet threaded plu must remain in place unless container is secured with valve outlet piped to use point Do not drag, slide or roll cylinders Use a suitable hand truck for cylinder movement Use a pressure reducing regulator when connecting cylinder to lower pressure (<3000 psi piping or systems Do not heat cylinder by any means to increase the discharge rate of product from the cylinder Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder

For additional handling recommendations, consult Compressed Gas Association's Pamphlets P-1, P-14, and G-4

SPECIAL STORAGE RECOMMENDATIONS

Protect cylinders from physical damage Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits and away from full or empty stored cylinders which contain flammable products Do not allow the temperature where cylinde are stored to exceed 130F (54C) Cylinders should be stored upright and firmly secured to prevent falling or being knocked over Full and empty cylinders should be segregated Use a "first in-first out' inventory system to prevent full cylinders being stored for excessive periods of time

For additional storage recommendations, consult Compressed Gas Association's Pamphlets P-1, P-14, and G-4

SPECIAL PACKAGING RECOMMENDATIONS

Carbon steels and low alloy steels are acceptable for use at lower pressures For high pressure applications use stainless steels, copper and its alloys, nickel and its alloys, brass, bronze, silicon alloys, Monel®, Inconel® or beryllium Lead and silver or lead and tin alloys are good gasketing materials Teflon® and Kel-F® are the preferred nonmetal gaskets

Special Note It should be recognized that the ignition temperature of metals and nonmetals in pure oxygen service decreases with increasing oxygen pressure.

OTHER RECOMMENDATIONS OR PRECAUTIONS

Oxygen should not be used as a substitute for compressed air in pneumatic equipment since this type generally contains flammable lubricants Equipment to contain oxygen must be "cleaned for oxygen service ' See Compressed Gas Association Pamphlet G-4 1 Compressed gas cylinders should not be refilled except by qualified producers of compressed gases Shipment of a compressed gas cylinder which has not been filled by [illegible] violation of Federal Law (49CFR)

Monsanto MATERIAL SAFETY DATA

MONSANTO PRODUCT NAME

Polychlorinated Biphenyls (PCBs)

MONSANTO COMPANY
800 N LINDBERGH BLVD
ST LOUIS MO 63167

Emergency Phone No
(Call Collect)
314 694-1000

Date 10/88

PRODUCT IDENTIFICATION

Synonyms PCBs
Chlorodiphenyl (__% Cl)
Chlorinated biphenyl
Polychlorinated biphenyl
Chlorinated biphenyls
(approx __% Cl)

Trade Names/ Common Names Aroclor®[1] Series 1016 1221 1232 1242 1248 1254 1260
Therminol®[1] FR Series

PYRANOL®[2] and INERTEEN®[3] are trademarks for commonly used dielectric fluids that may have contained varying amounts of PCBs as well as other components including chlorinated benzenes

ASKAREL - Generic name for a broad class of fire resistant synthetic chlorinated hydrocarbons and mixtures used as dielectric fluids that commonly contained about 30 70% PCBs Some ASKAREL fluids contained 99% or greater PCBs and some contained no PCBs

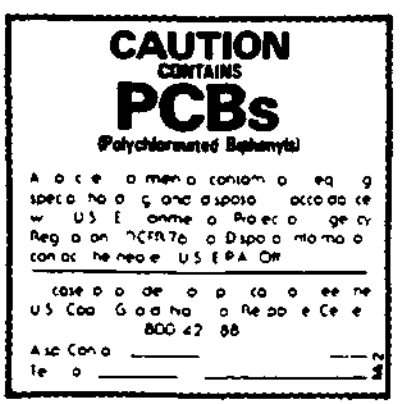
This list of trade names is representative of several commonly used Monsanto products (or products formulated with Monsanto products) Other trademarked PCB products were marketed by Monsanto and other manufacturers PCBs were also manufactured and sold by several European and Japanese companies Contact the manufacturer of the trademarked product if not in this listing to determine if the formulation contained PCBs

® Registered trademark of Monsanto Company
®[2] Registered trademark of General Electric Company
®[3] Registered trademark of Westinghouse Electric Corporation

CAS No s 001336363 053469219 021672296 01109769 011096825 and others

WARNING STATEMENTS

Federal regulations under the Toxic Substances Control Act require PCBs PCB items storage areas transformer vaults and transport vehicles to be marked (check regulations 40 CFR 761 for details)



HEALTH EFFECTS SUMMARY *(continued)*

Other

There are literature reports that PCBs can impair reproductive functions in monkeys The National Cancer Institute performed a study in 1977 using Aroclor 1254 with both sexes of rats NCI stated that the PCB Aroclor 1254 was not carcinogenic under the conditions of their bioassay There is sufficient evidence in the scientific literature to conclude that Aroclor 1260 can cause liver cancer when fed to rodents at high doses Similar experiments with less chlorinated PCB products have produced negative or equivocal results

The consistent finding in animal studies is that PCBs produce liver injury following prolonged and repeated exposure by any route if the exposure is of sufficient degree and duration Liver injury is produced first and by exposures that are less than those reported to cause cancer in rodents Therefore exposure by all routes should be kept sufficiently low to prevent liver injury

Numerous epidemiological studies of humans both occupationally exposed and non worker environmentally exposed populations have not demonstrated any causal relationship between PCB exposures and chronic human illnesses such as cancer or neurological or cardiovascular effects PCBs can cause dermatological symptoms however these are reversible upon removal of exposure source

PCBs are identified as hazardous chemicals under criteria of the OSHA Hazard Communication Standard (29 CFR Part 1910 1200) PCBs have been listed in the International Agency for Research on Cancer (IARC) Monographs (1987) Group 2A and in the National Toxicology Program (NTP) Annual Report on Carcinogens (Fourth)

PHYSICAL DATA

PROPERTIES OF SELECTED AROCLORS

PROPERTY	1016	1221	1232	1242	1248	1254	1260
Color (APHA)	40	100	100	100	100	100	150
Physical state	mobile oil	mobile oil	mobile oil	mobile oil	mobile oil	viscous liquid	sticky resin
Stability	inert	inert	inert	inert	inert	inert	inert
Density (lb gal 25 C)	11 40	9 85	10 55	11 50	12 04	12 82	13 50
Specific gravity x/15 5 C	1 36 1 37 x 25	1 18 1 19 x 25	1 27 1 28 x 25	1 30 1 39 x 25	1 40 1 41 x 65	1 49 1 50 x 65	1 55 1 56 x 90
Distillation range (C)	323 356	275 320	290 325	325 366	340 375	365 390	385 420
Acidity mg KOH/g maximum	010	014	014	015	010	010	014
Fire point (°C)	none to boiling point	176	238	none to boiling point	none to boiling point	none to boiling point	none to boiling point
Flash point (°C)	170	141 150	152 154	176 180	193 196	none	none
Vapor pressure (mm Hg @ 100 F)	NA	NA	0 005	0 001	0 00037	0 00006	NA
Viscosity (Saybolt Univ Sec @ 100 F) (centistokes)	71 81 13 16	38 41 3 6 4 6	44 51 5 5 7 7	82 92 16 19	185 240 42 52	1800 2500 390 540	— —

NA—Not Available

SPILL, LEAK & DISPOSAL INFORMATION

Cleanup and disposal of liquid PCBs and other PCB items are strictly regulated by the federal government The regulations are found at 40 CFR Part 761 Consult these regulations as well as applicable state and local regulations prior to any disposal of PCBs PCB items or PCB contaminated items

If PCBs leak or are spilled the following steps should be taken immediately

All non-essential personnel should leave the leak or spill area

The area should be adequately ventilated to prevent the accumulation of vapors

The spill/leak should be contained Loss to sewer systems navigable waterways and streams should be prevented Spills/leaks should be removed promptly by means of absorptive material such as sawdust vermiculite dry sand clay dirt or other similar materials or trapped and removed by pumping or other suitable means (traps drip pans trays etc)

Personnel entering the spill or leak area should be furnished with appropriate personal protective equipment and clothing as needed See Occupational Control Procedures section of this MSDS

Personnel trained in the emergency procedures and protected against the attendant hazards should shut off sources of PCBs clean up spills control and repair leaks and fight fires in PCB areas

All wastes and residues containing PCBs (e g wiping cloths absorbent material used disposable protective gloves clothing etc) should be collected placed in proper containers marked and disposed of in the manner prescribed by EPA regulations (40 CFR Part 761) and applicable state and local regulations

Various federal state and local regulations may require immediate reporting of PCB spills and may also define spill clean-up levels Consult your attorney or appropriate regulatory officials for information relating to spill reporting and spill clean up

ENVIRONMENTAL INFORMATION

Care should be taken to prevent entry of PCBs into the environment through spills leakage use vaporization or disposal of liquids or solids PCBs can accumulate in the environment and can adversely affect some animals and aquatic life In general PCBs have low solubility in water are strongly bound to soils and sediments and are slowly degraded by natural processes in the environment

ADDITIONAL COMMENTS

Polychlorinated Biphenyls

For regulatory purposes under the Toxic Substances Control Act the term PCBs refers to a chemical substance limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contain such substance (40 CFR Part 761)

Chemically commercial PCBs are defined as a series of technical mixtures consisting of many isomers and compounds that vary from mobile oily liquids to white crystalline solids and hard non crystalline resins Technical products vary in composition in the degree of chlorination and possibly according to batch

The mixtures generally used contain an average of 3 atoms of chlorine per molecule (42% chlorine) to 5 atoms of chlorine per molecule (54% chlorine) They are used as components of dielectric fluids in transformers and capacitors Prior to 1972 PCB applications included heat transfer media hydraulic and other industrial fluids plasticizers carbonless paper paints inks and adhesives

In 1972 Monsanto restricted sales of PCBs to applications involving only closed electrical systems (transformers and capacitors) In 1977 all manufacturing and sales were voluntarily terminated In 1979 EPA restricted the manufacture processing use and distribution of PCBs to specifically exempted and authorized activities

FOR ADDITIONAL NON EMERGENCY INFORMATION CONTACT

John H Craddock
Product & Environmental Safety Director

Paul R Michael
Product & Environmental Safety Manager

Environmental Policy Staff
Monsanto Company
800 North Lindbergh Boulevard
St Louis Missouri 63167
(314) 694 4764

PRODUCT NAME PREMIUM UNLEADED GASOLINE
MARATHON MSDS NO 114MAR001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME PREMIUM UNLEADED GASOLINE

SYNONYMS
GASOLINE PREMIUM UNLEADED PREMIUM UNLEADED
GASOLINE SUPER UNLEADED GASOLINE SUPER-M
LEAD FREE GASOLINE

MANUFACTURER / DISTRIBUTOR
MARATHON PETROLEUM COMPANY
539 SOUTH MAIN STREET
FINDLAY, OH
45840

EMERGENCY PHONE NUMBERS
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY PETROLEUM HYDROCARBON CAS NO MIXTURE
CHEMICAL FORMULA MIXTURE PRODUCT CODE

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
90-437 F	N A F	0 71-0 77
% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
NEGLIGIBLE	3-4	414-776 MM HG @ 100F

PH INFORMATION PH N A AT CONC
APPEARANCE RED OR CLEAR LIQUID ODOR GASOLINE ODOR

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
0 F	C A 495 F	LOWER/UPPER 1 4/ 7 6

EXTINGUISHING MEDIA

ONLY U L APPROVED CLASS B FIRE EXTINGUISHING MEDIA SUCH AS FOAM CO2 HALON 1211 OR DRY CHEMICAL WATER SHOULD BE USED ONLY BY QUALIFIED FIRE FIGHTING PERSONNEL

SPECIAL FIRE FIGHTING INSTRUCTIONS

CAUTION MUST BE FOLLOWED AFTER EXTINGUISHMENT DUE TO EASE OF REIGNITION OF HOT GASOLINE VAPORS WATER CAN BE USED TO COOL EXPOSED SURFACES

STABILITY THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID

HAZARDOUS DECOMPOSITION PRODUCTS
CARBON MONOXIDES, ALDEHYDES AROMATIC HYDROCARBONS

INCOMPATIBLE MATERIALS
OXIDIZERS

HAZARDOUS POLYMERIZATION WILL NOT OCCUR

PRODUCT NAME PREMIUM UNLEADED GASOLINE
MARATHON MSDS NO 114MAR001

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT	TLV		SOURCE
PREMIUM UNLEADED GASOLINE	300 00 PPM	(8 HR TWA)	ACGIH
	500 00 PPM	(STEL)	ACGIH

COMPONENTS	PERCENT RANGE	TLV			SOURCE
SATURATED HYDROCARBONS (PARAFFINS & CYCLOPARAFFINS)	59 00- 65 00	0 00		( )	
UNSATURATED HYDROCARBONS (OLEFINS)	1 00- 8 00	0 00		( )	
AROMATIC HYDROCARBONS (INCLUDING BENZENE TOLUENE, XYLENES ETHYLBENZENE AND TRIMETHYL BENZENES)	33 00- 38 00	0 00		( )	
BENZENE	50- 3 00	10 00	PPM	(8 HR TWA)	ACGIH
		25 00	PPM	(STEL)	ACGIH
		10 00	PPM	(8 HR TWA)	OSHA
		25 00	PPM	(CEILING)	OSHA
		50 00	PPM	(PEAK)	OSHA

MARATHON ACTION LEVEL 0 50 PPM (8 HR TWA)

***
COMPLEX MIXTURE OF PARAFFINIC, CYCLOPARAFFINIC, OLEFINIC AND AROMATIC HYDROCARBONS (PREDOMINANTLY C4-C12)
***
CONTAINS SMALL AMOUNTS OF DYE AND OTHER ADDITIVES (<0 02%) WHICH ARE NOT CONSIDERED HAZARDOUS AT THE CONCENTRATIONS USED

SECTION 5 - POTENTIAL HEALTH EFFECTS

EYE

EYE IRRITATION MAY RESULT FROM CONTACT WITH THE LIQUID OR EXPOSURE TO VAPOR CONCENTRATIONS ABOVE THE TLV

SKIN

PROLONGED OR REPEATED LIQUID CONTACT CAN DEFAT THE SKIN AND LEAD TO IRRITATION AND/OR DERMATITIS

INHALATION

EXPOSURE TO VAPOR CONCENTRATIONS EXCEEDING 1000 PPM CAN CAUSE RESPIRATORY IRRITATION, HEADACHE DIZZINESS NAUSEA AND LOSS OF COORDINATION HIGHER CONCENTRATIONS MAY CAUSE LOSS OF CONSCIOUSNESS, CARDIAC SENSITIZATION, COMA AND DEATH RESULTING FROM RESPIRATORY FAILURE

INGESTION

INGESTION MAY RESULT IN NAUSEA VOMITING DIARRHEA AND RESTLESSNESS ASPIRATION (BREATHING) OF VOMITUS INTO THE LUNGS MUST BE AVOIDED AS EVEN SMALL QUANTITIES IN THE LUNGS CAN PRODUCE CHEMICAL PNEUMONITIS AND PULMONARY EDEMA/HEMORRHAGE

PRODUCT NAME PREMIUM UNLEADED GASOLINE
MARATHON MSDS NO 114MAR001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

ADDITIONAL TOXICITY INFORMATION

TWO YEAR INHALATION TOXICITY STUDIES WITH FULLY VAPORIZED GASOLINE (67, 292 & 2056 PPM) PRODUCED KIDNEY DAMAGE AND KIDNEY TUMORS IN MALE RATS BUT NOT IN FEMALE RATS OR MALE AND FEMALE MICE FEMALE MICE DEVELOPED A SLIGHTLY HIGHER INCIDENCE OF LIVER TUMORS COMPARED TO CONTROLS AT THE HIGHEST EXPOSURE LEVEL SINCE THESE RESPONSES ARE SPECIES SPECIFIC AND HAVE NOT BEEN OBSERVED IN HUMANS, THEIR BIOLOGIC SIGNIFICANCE AS IT RELATES TO HUMAN HEALTH IS DIFFICULT TO INTERPRET AT THIS TIME THE AMERICAN PETROLEUM INSTITUTE IS CURRENTLY CONDUCTING STUDIES TO HELP ANSWER THESE QUESTIONS CHRONIC HUMAN HEALTH EFFECTS WOULD NOT BE EXPECTED AS LONG AS GOOD PERSONAL HYGIENE AND PROPER SAFETY PRECAUTIONS ARE PRACTICED

PROLONGED AND REPEATED OVEREXPOSURE TO BENZENE MAY PRODUCE INJURY OF THE BLOOD-FORMING TISSUES CAUSING BLOOD ABNORMALITIES AND POSSIBLY LEUKEMIA HOWEVER EXPOSURES TO SUCH HIGH LEVELS ARE NOT LIKELY TO BE ENCOUNTERED IN TYPICAL GASOLINE HANDLING OPERATIONS DUE TO THE COMPARATIVELY LOW BENZENE CONTENT

EMERGENCY FIRST AID PROCEDURES

EYE

FLUSH EYES WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES IF SYMPTOMS OR IRRITATION OCCUR CALL A PHYSICIAN

SKIN

WASH WITH SOAP AND LARGE AMOUNTS OF WATER REMOVE CONTAMINATED CLOTHING IF SYMPTOMS OR IRRITATION OCCUR CALL A PHYSICIAN

INHALATION

MOVE PERSON TO FRESH AIR IF NOT BREATHING OR IF NO HEARTBEAT GIVE ARTIFICIAL RESPIRATION OR CARDIOPULMONARY RESUSCITATION (CPR) IMMEDIATELY CALL A PHYSICIAN

INGESTION

DO NOT INDUCE VOMITING DO NOT GIVE LIQUIDS IMMEDIATELY CALL A PHYSICIAN

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION

LOCAL OR GENERAL EXHAUST REQUIRED IN ENCLOSED AREAS OR WITH INADEQUATE VENTILATION

PRODUCT NAME PREMIUM UNLEADED GASOLINE
MARATHON MSDS NO 114MAR001

SECTION 6 - SPECIAL PROTECTION INFORMATION (CON'T)

RESPIRATORY PROTECTION

APPROVED ORGANIC VAPOR CHEMICAL CARTRIDGE OR SUPPLIED AIR RESPIRATORS SHOULD BE WORN FOR EXPOSURES EXCEEDING THE TLV OR STEL OBSERVE RESPIRATOR PROTECTION FACTOR CRITERIA CITED IN ANSI Z88 2 (1980)

PROTECTIVE GLOVES

NEOPRENE NITRILE OR PVA GLOVES FOR REPEATED OR PROLONGED SKIN EXPOSURE

OTHER PROTECTIVE EQUIPMENT

USE EXPLOSION-PROOF EQUIPMENT

SECTION 7 - SPILL OR LEAK PROCEDURES

ENVIRONMENTAL EFFECTS

LIQUID CAN BE TOXIC TO AQUATIC LIFE

STEPS TO BE TAKEN IN CASE OF SPILL LEAK OR RELEASE

KEEP PUBLIC AWAY SHUT OFF SOURCE OF LEAK IF POSSIBLE TO DO SO WITHOUT HAZARD ELIMINATE ALL IGNITION SOURCES ADVISE NATIONAL RESPONSE CENTER (800-424-8802) IF PRODUCT HAS ENTERED A WATER COURSE ADVISE LOCAL AND STATE EMERGENCY SERVICES AGENCIES IF APPROPRIATE CONTAIN LIQUID WITH SAND OR SOIL RECOVER AND RETURN FREE LIQUID TO SOURCE USE SUITABLE SORBENTS TO CLEAN UP RESIDUAL LIQUID

WASTE DISPOSAL METHOD

DISPOSE OF CLEANUP MATERIALS IN ACCORDANCE WITH APPLICABLE LOCAL STATE AND FEDERAL REGULATIONS

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

USE APPROPRIATELY GROUNDED DISPENSING PRACTICES STORE IN A RELATIVELY COOL PLACE DO NOT EXPOSE TO HEAT, OPEN FLAMES OR OXIDIZERS

PRODUCT NAME PREMIUM UNLEADED GASOLINE
MARATHON MSDS NO 114MAR001

SECTION 9 - HAZARD WARNING

DANGER!

EXTREMELY FLAMMABLE

HARMFUL OR FATAL IF SWALLOWED

CONTAINS BENZENE WHICH MAY CAUSE
CANCER OR BE TOXIC TO BLOOD-FORMING ORGANS

SECTION 10 - ADDITIONAL COMMENTS

INFORMATION SUPPLIED BY COORDINATOR TOXICOLOGY AND PRODUCT SAFETY
CRAIG M PARKER PHONE (419)422-2121

MSDS DATE 04/10/87 DATE OF PREVIOUS MSDS / /

*** DISCLAIMER ***

THE INFORMATION RELATES ONLY TO THE SPECIFIC MATERIAL DESIGNATED AND MAY NOT BE VALID FOR MATERIAL USED IN COMBINATION WITH ANY OTHER MATERIALS OR IN ANY PROCESS SUCH INFORMATION IS TO THE BEST OF MARATHON PETROLEUM COMPANY'S KNOWLEDGE AND BELIEF ACCURATE AND RELIABLE AS OF THE DATE INDICATED HOWEVER NO REPRESENTATION, WARRANTY OR GUARANTEE IS MADE AS TO ITS ACCURACY RELIABILITY OR COMPLETENESS IT IS THE USER'S RESPONSIBILITY TO SATISFY HIMSELF AS TO THE SUITABLENESS AND COMPLETENESS OF SUCH INFORMATION FOR HIS OWN PARTICULAR USE

PREPARED [illegible]

Material Safety Data Sheet

CONFIDENTIAL

Manufacturer's Name J C WHITLAM MFG CO

Address P O. BOX 71

WADSWORTH, OH 44281

Emergency Phone No (216) 334-2524

PRODUCT IDENTIFICATION

Chemical Name KETONE

Common Name N/A

Product Name PURPLE PRIMER

CAS Number SEE BELOW

Chemical Formula N/A

Product Use PRIMER/CLEANER FOR PIPE

HAZARDOUS INGREDIENTS

Chemical Name	Common Name	CAS NO	%	OSHA PEL	ACGIH TLV TWA
METHYL ETHYL KETONE*	N/A	00078933	70	N/A	200
TETRAHYDROFURAN		00109999	30		200

(* SUBJECT TO REPORTING SECTION 313 SARA)

PHYSICAL DATA

Boiling Point (760mm Hg) 153

Specific Gravity (Water = 1) 83

Vapor Pressure (mm Hg) N/A

% Non Volatile 01

Vapor Density (AIR = 1) DENSER THAN AIR

Evaporation Rate (BUTYL ACETATE = 1) 6.1

Solubility in Water COMPLETE

pH N/A

Appearance PURPLE LIQUID

Odor ETHEPEAL ODOP

FIRE AND EXPLOSION HAZARD DATA

Flash Point 6 °F

Flammable Limits Lel 6°F Uel

Method Used TCC

Extinguishing Media DRY CHEMICAL OR CARBON DIOXIDE

Special Fire Fighting Procedures USE SPRAY NOZZLE DISCHARGE TO ASSIST IN CONTROLLING FIRE

Unusual Fire and Explosion Hazards NONE

Hazardous Decomposition Products NONE

HEALTH HAZARD DATA

Oral Toxicity HARMFUL OR FATAL IF SWALLOWED

Dermal Toxicity SKIN IRRITANT

Eye EYE IRRITANT

Inhalation NARCOSIS

Chronic Toxicity NONE

Mutagenesis NONE

Effects of Overexposure

Ingestion. MAY CAUSE NAUSEA, DROWSINESS

Skin Contact MAY CAUSE IRRITATION TO SENSITIVE SKIN

Eye Contact MAY CAUSE IRRITATION TO EYES

Inhalation NAUSEA, DROWSINESS

Acute Systemic Effects NONE

Chronic Systemic Effects NONE

EMERGENCY AND FIRST AID PROCEDURES

Eye Contact FLUSH EYES WITH WATER FOR 15 MINUTES CALL PHYSICIAN

Skin Contact WASH WITH SOAP AND WATER WASH CLOTHING BEFORE RE-USE

Inhalation REMOVE TO FRESH AIR GIVE ARTIFICIAL RESPIRATION AND OXYGEN IF NECESSARY

Ingestion DO NOT INDUCE VOMITING CALL PHYSICIAN IMMEDIATELY

REACTIVITY DATA

Stability ☒ Stable ☐ Unstable	Conditions to Avoid
Incompatibility (Materials to Avoid)	NONE
Can Hazardous Polymerization Occur	NO
Hazardous Decomposition Products and Conditions	NONE

SPILL OR LEAK PROCEDURES

Response to Small Spills	NORMAL GOOD HOUSEKEEPING PROCEDURES
Response to Large Spills	ELIMINATE ALL IGNITION SOURCES FLUSH WITH WATER
Hazards to be Avoided	ANY HEAT OR FLAME
Reportable Quantity	NONE
Waste Classification	HAZARDOUS
Disposal Methods	EVAPORATE IN ABSENCE OF ANY HEAT OR FLAME

SPECIAL PROTECTION INFORMATION

Respiratory Protection	NORMAL VENTILATION
For Hands Body	PVA GLOVES,
For Eyes	SAFETY GOGGLES
Ventilation	NORMAL

SPECIAL PRECAUTIONS

Other Precautions
STORE AWAY FROM HEAT OR FLAME
AVOID PROLONGED CONTACT WITH SKIN
AVOID PROLONGED BREATHING OF VAPORS
DO NOT TAKE INTERNALLY

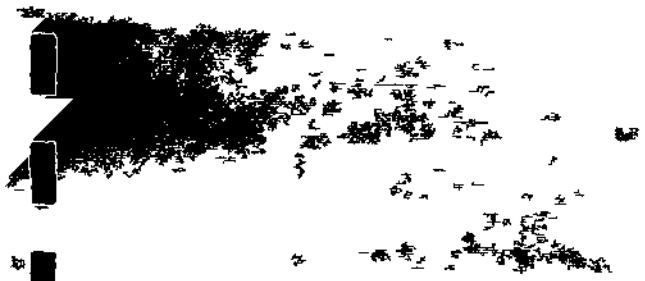
LABELING INFORMATION

DOT Shipping Name	CEMENT, LIQUID
DOT Label	FLAMMABLE MATERIAL, RED LABEL REQUIRED
UN No	1133

Other Contents of Product Label

N/A

WARNING DO NOT USE NEAR HEAT, SPARKS OR OPEN FLAME
KEEP CLOSED WHEN NOT IN USE
STORE IN COOL, DRY PLACE
KEEP OUT OF REACH OF CHILDREN



MATERIAL SAFETY DATA SHEET

DATE OF ISSUE January 9, 1989

Section 1 Identity of Material

303/623-5716 COLLECT

Product Name or Number	OATEY REGULAR CLEAR PVC SOLVENT CEMENT
Synonyms	PVC Plastic Pipe Cement
Formula	PVC Resin in Solvent Solution
Chemical Family	PVC Organisol
Regulated Identification	DOT Proper Shipping Name: CEMENT
	Shipping ID Number: NA 1133
	EPA Hazardous Waste ID Number: D-001

Hazardous Ingredients	%	CAS Number
PVC Resin	10-14	9002-86-2
Tetrahydrofuran	25-40	109-99-9
(SARA Sec 313 **) Methyl Ethyl Ketone	40-55	078-93-3
Cyclohexanone	5-10	108-94-1
(SARA Sec 313 **) Acetone	< 15	067-64-1

Section 2 Hazard Specifications

Known Hazards Under 29 CFR 1910 1200

	YES	NO		YES	NO
Combustible Liquid		X	Skin Hazard	X	
Flammable Material	X		Eye Hazard	X	
Pyrophoric Material		X	Toxic Agent	X	
Explosive Material		X	Highly Toxic Agent		X
Unstable Material		X	Sensitizer		X
Water Reactive Mat		X	Carcinogen		X
Oxidizer		X	Reproductive Toxin	X	
Organic Peroxide		X	Blood Toxin		X
Corrosive Material		X	Nervous Sys Toxin	X	
Compressed Gas		X	Lung Toxin	X	
Irritant	X		Liver Toxin	X	
			Kidney Toxin	X	

TLV, PEL and STEL

THF TLV-200 ppm, 590 mg/m^3
PEL-200 ppm, 590 mg/m^3
STEL-250 ppm, 735 mg/m^3

CYH TLV-25 ppm, 100 mg/m^3 (skin)
PEL-50 ppm, 200 mg/m^3
STEL-100 ppm, 400 mg/m^3

MEK TLV-200 ppm, 590 mg/m^3
PEL-200 ppm, 590 mg/m^3
STEL-300 ppm, 885 mg/m^3

ACETONE TLV (TWA) = 750 ppm, 1780 mg/m^3
PEL = 750 ppm, 1800 mg/m^3
STEL = 1000 ppm, 2375 mg/m^3

NFPA Hazard Signal

Health	1	Flammability	3
Stability	0	Special	NONE

DOT Hazard Class - Flammable Liquid

EPA Hazard Waste Class
Ignitable Waste
Toxic Waste

** Acetone and MEK are identified as a SARA Section 313 Toxic Chemical

OATEY REGULAR CLEAR PVC CEMENT Section 3 Health Hazard Data

Effects of Exposure.

ENTRY ROUTE Inhale X Ingest X Skin X Eye X+

Inhalation May cause irritation of mucous membrane, nose & throat, headache, dizziness, nausea, numbness the extremities and narcosis in high concentrations Has caused CNS depression, liver damage in animals, & high concentrations have caused retardation of fetal development in rats

Ingestion May be aspirated into the lungs or cause systemic effects described under inhalation

Skin: Chronic contact may lead to irritation and dermatitis Chronic exposure to vapors of high concentration may cause dermatitis May possibly be absorbed through the skin

Eye: Vapors or direct contact may cause irritation

Section 4 Emergency Response Data

Exposure	First Aid Measures INHALATION - Move to fresh air If breathing is difficult, give oxygen If not breathing, give artificial respiration Keep victim quiet and warm Call a poison control center or physician immediately SKIN - Flush with water, then wash thoroughly with soap and water Remove contaminated clothing and wash before reuse Call a poison control center or physician if irritation persists. EYES - Flush with water for 15 minutes and call a poison control center or physician if an irritation persists INGESTION - Drink plenty of water DO NOT INDUCE VOMITING, and call a poison control center or physician immediately Avoid alcoholic beverages Never give anything by mouth to an unconscious person
Fire	Special Procedures For small fires Use dry chemical, CO_2, water or foam extinguisher For large fires Evacuate area and call Fire Department immediately
Spills	Steps To Be Taken Ventilate area, stop leak if it can be done without risk Take up with sand, earth or other absorbing material Dispose of according to local, state & Federal Reg

Section 5 Safe Usage Data

Protective Equipment Types	Eyes Safety Glasses with Side Shields
	Respiratory NIOSH-Approved cannister respirator in absence of adequate ventilation
	Gloves Rubber Gloves
	Other Eye wash and safety shower should be available
Ventilation	General Mechanical Exhaust ventilation capable of maintaining emissions at the point of use below PEL Local Exhaust Open doors & windows If used in enclosed area, use exhaust fan to remove fumes
Precautions	Handling & Storage Keep away from heat, sparks and flames, store in a cool, dry place
	Other. Containers, even those that have been emptied, will retain product residue and vapors Handle empty containers as if they were full

OATEY REGULAR CLEAR PVC CEMENT Section 6 Physical Hazard Data

Flammability	LFL= 1 8 % Volume UFL= 11 8 % Volume			Flashpoint 0 - 5°F Method Used Tag Closed Cup	
Stability	Stable	X	Conditions To Avoid Heat, sparks and open flame		
	Unstable		Hazardous Decomp Pdts Carbon monoxide/carbon dioxide/hydrogen chloride/smoke		
Hazardous Polymerization	May Occur		Conditions to Avoid NONE		
	Will Not Occur	X			
Incompatibility	Materials To Avoid Acids, oxidizing materials, alkalis, chlorinated inorganics (Potassium, Calcium, and Sodium Hypochlorite), copper or copper alloys				

Section 7 Physical and Chemical Properties

Boiling Pt 151 °F 66 °C	Vapor Density (Air 1) 2 5	Volatile Components 88 ± 2%
Vapor Press 145 mmHg @ 20 C	pH N/A	Sp Gravity 0 90 ± 0 015
Solubility In H_2O Negligible	Will Dissolve In TETRAHYDROFURAN	Evaporation Rate (B U A C =1) 5 5 - 8 0

Appearance	Clear Liquid	Is Material	Paste Powder
Odor	Ether-like	Solid	(Liquid) Gas

Section 8 Manufacturer of Supplier Data

Firm Name & Mailing Address OATEY CO P O Box 35906 4700 W 160th Street Cleveland, OH 44135 (216) 267-7100)	Name (Print) Paul E Naton
	Signature Paul E. Naton
	Title Manager, Research & Development
	Date January 9, 1989
	Emergency Telephone Nb (303) 623-5716 (Collect)

The information herein has been compiled from sources believed to be reliable, up-to-date, and is accurate to the best of our knowledge However, Oatey Company cannot give any guarantees regarding information from other sources, and expressly does not make any warranties, nor assumes any liability for its use

PRODUCT NAME MARAFUEL
MARATHON MSDS NO 120MAR001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME MARAFUEL

SYNONYMS
MARAFUEL MARAFUEL DIESEL MARAFUEL DIESEL NO 2 MARAFUEL NO 2 NO 2 MARATHON FUEL OIL, WINTERIZED DIESEL

MANUFACTURER / DISTRIBUTOR
MARATHON PETROLEUM COMPANY
539 SOUTH MAIN STREET
FINDLAY, OH
45840
EMERGENCY PHONE NUMBERS
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY PETROLEUM HYDROCARBON
CHEMICAL FORMULA MIXTURE
CAS NO MIXTURE
PRODUCT CODE

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
350-660 F	N A F	C A 0 8
% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
NEGLIGIBLE	4-5	1 - 10 MM HG @ 100F

PH INFORMATION PH N A AT CONC
APPEARANCE AMBER LIQUID ODOR KEROSENE ODOR

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
130 (MIN) F	C A 494 F	LOWER/UPPER 0 7/5 0

TINGUISHING MEDIA

ONLY U L APPROVED CLASS B FIRE EXTINGUISHING MEDIA SUCH AS FOAM CO2 HALON 1211 OR DRY CHEMICAL WATER SPRAY SHOULD BE USED ONLY BY QUALIFIED FIRE FIGHTING PERSONNEL

SPECIAL FIRE FIGHTING INSTRUCTIONS

AVOID USE OF WATEP STREAMS AVOID EXCESSIVE WATER SPRAY APPLICATION WATER CAN BE USED TO COOL EXPOSED SURFACES

STABILITY THE MATERIAL IS STABLE AT 70 F 760MM PRESSURE
CONDITIONS TO AVOID

HAZARDOUS DECOMPOSITION PRODUCTS
CARBON MONOXIDE ALDEHYDES, AROMATICS OTHER HYDROCARBONS

INCOMPATIBLE MATERIALS
OXIDIZERS

HAZARDOUS POLYMERIZATION WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT	TLV	SOURCE
MARAFUEL	NONE ESTABLISHED	

Marathon Petroleum Company

PRODUCT NAME MARAFUEL
MARATHON MSDS NO 120MAR001

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS (CON'T)

COMPONENTS	PERCENT RANGE	TLV		SOURCE
SATURATED HYDROCARBONS (PARAFFINS & CYCLOPARAFFINS)	54 00- 85 00	0 00	( )	
UNSATURATED HYDROCARBONS (OLEFINS)	1 00- 6 00	0 00	( )	
AROMATIC HYDROCARBONS	15 00- 45 00	0 00	( )	

***
AROMATIC HYDROCARBONS MAY INCLUDE INDANES DIPHENYLS METHYLNAPHTHALENES ALKYLBENZENES DI- TRI- AND POLYCYCLIC AROMATICS
***
COMPLEX MIXTURE OF PARAFFINIC CYCLOPARAFFINIC OLEFINIC AND AROMATIC HYDROCARBONS (PREDOMINANTLY C9 THROUGH C20)
***
CONTAINS <0 5% SULFUR AND <0 01% BENZENE

SECTION 5 - POTENTIAL HEALTH EFFECTS

EYE

SHORT-TERM LIQUID OR VAPOR CONTACT MAY RESULT IN SLIGHT EYE IRRITATION

SKIN

PROLONGED OR REPEATED LIQUID CONTACT CAN CAUSE DEFATTING AND DRYING OF THE SKIN WHICH MAY PRODUCE SEVERE IRRITATION OR DERMATITIS

INHALATION

HIGH VAPOR CONCENTRATIONS MAY PRODUCE HEADACHE GIDDINESS VERTIGO AND ANESTHETIC STUPOR

INGESTION

INGESTION MAY RESULT IN NAUSEA VOMITING DIARRHEA AND RESTLESSNESS ASPIRATION (BREATHING) OF VOMITUS INTO THE LUNGS MUST BE AVOIDED AS EVEN SMALL QUANTITIES IN THE LUNGS CAN PRODUCE CHEMICAL PNEUMONITIS AND PULMONARY EDEMA/HEMORRHAGE

ADDITIONAL TOXICITY INFORMATION

LIFETIME SKIN PAINTING STUDIES IN ANIMALS WITH SIMILAR DISTILLATE FUELS HAVE PRODUCED WEAK CARCINOGENIC ACTIVITY FOLLOWING PROLONGED AND REPEATED EXPOSURE REPEATED DERMAL APPLICATION HAS PRODUCED SEVERE IRRITATION AND SYSTEMIC TOXICITY IN SUBACUTE TOXICITY STUDIES SOME COMPONENTS OF DISTILLATE FUELS I E , PARAFFINS AND OLEFINS, HAVE BEEN SHOWN TO PRODUCE A SPECIES SPECIFIC SEX HORMONAL DEPENDENT KIDNEY LESION IN MALE RATS FROM REPEATED ORAL OR INHALATION EXPOSURE NO 2 DISTILLATE FUELS WERE FOUND TO BE POSITIVE IN SOME MUTAGENICITY TESTS WHILE NEGATIVE IN OTHERS THE EXACT RELATIONSHIP BETWEEN THESE RESULTS AND HUMAN HEALTH IS NOT KNOWN CHRONIC HUMAN HEALTH EFFECTS WOULD NOT BE EXPECTED AS LONG AS GOOD PERSONAL HYGIENE AND PROPER SAFETY PRECAUTIONS ARE PRACTICED

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON T)

MERGENCY FIRST AID PROCEDURES

EYE

FLUSH EYES WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES IF SYMPTOMS OR IRRITATION OCCUR CALL A PHYSICIAN

SKIN

WASH WITH SOAP AND LARGE AMOUNTS OF WATER REMOVE CONTAMINATED CLOTHING IF SYMPTOMS OR IRRITATION OCCUR CALL A PHYSICIAN

INHALATION

MOVE PERSON TO FRESH AIR IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. CALL A PHYSICIAN

INGESTION

DO NOT INDUCE VOMITING DO NOT GIVE LIQUIDS IMMEDIATELY CALL A PHYSICIAN

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION

LOCAL OR GENERAL EXHAUST REQUIRED WHEN SPRAYING OR USING AT ELEVATED TEMPERATURES

ESPIRATORY PROTECTION

APPROVED ORGANIC VAPOR CHEMICAL CARTRIDGE OR SUPPLIED AIR RESPIRATORS SHOULD BE WORN WHEN EXCESSIVE VAPORS OR MISTS ARE GENERATED

PROTECTIVE GLOVES

NEOPRENE NITRILE OR PVA GLOVES TO PREVENT SKIN CONTACT

OTHER PROTECTIVE EQUIPMENT

USE MECHANICAL VENTILATION EQUIPMENT THAT IS EXPLOSION-PROOF

DUCT NAME MARAFUEL
RATHON MSDS NO 120MAR001

SECTION 7 - SPILL OR LEAK PROCEDURES

VIRONMENTAL EFFECTS

LIQUID CAN BE TOXIC TO AQUATIC LIFE

STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE

KEEP PUBLIC AWAY SHUT OFF SOURCE OF LEAK IF POSSIBLE TO DO SO WITHOUT HAZARD ELIMINATE ALL IGNITION SOURCES ADVISE NATIONAL RESPONSE CENTER (800-424-8802) IF PRODUCT HAS ENTERED A WATER COURSE ADVISE LOCAL AND STATE EMERGENCY SERVICES AGENCIES IF APPROPRIATE CONTAIN LIQUID WITH SAND OR SOIL RECOVER AND RETURN FREE LIQUID TO SOURCE USE SUITABLE SORBENTS TO CLEAN UP RESIDUAL LIQUIDS

WASTE DISPOSAL METHOD

DISPOSE OF CLEANUP MATERIALS IN ACCORDANCE WITH APPLICABLE LOCAL STATE AND FEDERAL REGULATIONS

ECTION 8 - HANDLING AND STORAGE PRECAUTIONS

USE APPROPRIATE GROUNDING DISPENSING TECHNIQUES AVOID REPEATED OR PROLONGED SKIN CONTACT EXERCISE GOOD PERSONAL HYGIENE INCLUDING REMOVAL OF SOILED CLOTHING AND PROMPT WASHING WITH SOAP AND WATER STORE IN CLEARLY MARKED CONTAINERS IN A RELATIVELY COOL LOCATION DO NOT EXPOSE TO HEAT OPEN FLAME OR OXIDIZERS

TION 9 - HAZARD WARNING

WARNING!

COMBUSTIBLE LIQUID
HARMFUL OR FATAL IF SWALLOWED
PRODUCES SKIN IRRITATION UPON PROLONGED OR REPEATED CONTACT

SECTION 10 - ADDITIONAL COMMENTS

FORMATION SUPPLIED BY COORDINATOR TOXICOLOGY AND PRODUCT SAFETY
CRAIG M PARKER PHONE (419)422-2121

MSDS DATE 08/05/85 DATE OF PREVIOUS MSDS / /

ROD CT NAME MARAFUEL
MARATHON MSDS NO 120MAR001

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PRODUCT NAME REGULAR UNLEADED GASOLINE
MARATHON MSDS NO 115MAR001

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT	TLV			SOURCE
REGULAR UNLEADED GASOLINE	300 00	PPM	(8 HR TWA)	ACGIH
	500 00	PPM	(STEL)	ACGIH

COMPONENTS	PERCENT RANGE	TLV			SOURCE
SATURATED HYDROCARBONS (PARAFFINS & CYCLOPARAFFINS)	57 00- 59 00	0 00		( )	
UNSATURATED HYDROCARBONS (OLEFINS)	1 00- 7 00	0 00		( )	
AROMATIC HYDROCARBONS (INCLUDING BENZENE TOLUENE, XYLENES, ETHYLBENZENE AND TRIMETHYL BENZENES)	30 00- 40 00	0 00		( )	
BENZENE	50- 3 00	10 00	PPM	(8 HR TWA)	ACGIH
		1 00	PPM	(8 HR TWA)	OSHA
		5 00	PPM	(STEL)	OSHA

MARATHON ACTION LEVEL 0 50 PPM (8 HR TWA)

***
COMPLEX MIXTURE OF PARAFFINIC CYCLOPARAFFINIC, OLEFINIC AND AROMATIC HYDROCARBONS (PREDOMINANTLY C4-C12)
***
CONTAINS SMALL AMOUNTS (0 02/) OF DYES AND OTHER ADDITIVES WHICH ARE NOT CONSIDERED TO BE HAZARDOUS AT THE CONCENTRATIONS USED

SECTION 5 - POTENTIAL HEALTH EFFECTS

EYE

EYE IRRITATION MAY RESULT FROM CONTACT WITH THE LIQUID OR EXPOSURE TO VAPOR CONCENTRATIONS ABOVE THE TLV

SKIN

PROLONGED OR REPEATED LIQUID CONTACT CAN DEFAT THE SKIN AND LEAD TO IRRITATION AND/OR DERMATITIS

INHALATION

EXPOSURE TO VAPOR CONCENTRATIONS EXCEEDING 1000 PPM CAN CAUSE RESPIRATORY IRRITATION HEADACHE DIZZINESS NAUSEA AND LOSS OF COORDINATION HIGHER CONCENTRATIONS MAY CAUSE LOSS OF CONSCIOUSNESS, CARDIAC SENSITIZATION COMA AND DEATH RESULTING FROM RESPIRATORY FAILURE

INGESTION

INGESTION MAY RESULT IN NAUSEA VOMITING, DIARRHEA AND RESTLESSNESS ASPIRATION (BREATHING) OF VOMITUS INTO THE LUNGS MUST BE AVOIDED AS EVEN SMALL QUANTITIES IN THE LUNGS CAN PRODUCE CHEMICAL PNEUMONITIS AND PULMONARY EDEMA/HEMORRHAGE

RODUCT NAME REGULAR UNLEADED GASOLINE
ARATHON MSDS NO 115MARD01

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

ADDITIONAL TOXICITY INFORMATION

TWO YEAR INHALATION TOXICITY STUDIES WITH FULLY VAPORIZED GASOLINE (67 292 & 2056 PPM) PRODUCED KIDNEY DAMAGE & KIDNEY TUMORS IN MALE RATS BUT NOT IN FEMALE RATS OR MALE AND FEMALE MICE FEMALE MICE DEVELOPED A SLIGHTLY HIGHER INCIDENCE OF LIVER TUMORS COMPARED TO CONTROLS AT THE HIGHEST EXPOSURE LEVEL SINCE THESE RESPONSES ARE SPECIES SPECIFIC AND HAVE NOT BEEN OBSERVED IN HUMANS THEIR BIOLOGIC SIGNIFICANCE AS IT RELATES TO HUMAN HEALTH IS DIFFICULT TO INTERPRET AT THIS TIME THE AMERICAN PETROLEUM INSTITUTE IS CURRENTLY CONDUCTING STUDIES TO HELP ANSWER THESE QUESTIONS CHRONIC HUMAN HEALTH EFFECTS WOULD NOT BE EXPECTED AS LONG AS GOOD PERSONAL HYGIENE AND PROPER SAFETY PRECAUTIONS ARE PRACTICED

PROLONGED AND REPEATED OVEREXPOSURE TO BENZENE MAY PRODUCE INJURY TO THE BLOOD-FORMING TISSUES CAUSING BLOOD ABNORMALITIES AND POSSIBLY LEUKEMIA HOWEVER EXPOSURES TO SUCH HIGH LEVELS ARE NOT LIKELY TO BE ENCOUNTERED IN TYPICAL GASOLINE HANDLING OPERATIONS DUE TO THE COMPARATIVELY LOW BENZENE CONTENT

EMERGENCY FIRST AID PROCEDURES

EYE

FLUSH EYES WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES IF SYMPTOMS OR IRRITATION OCCUR, CALL A PHYSICIAN

SKIN

WASH WITH SOAP AND LARGE AMOUNTS OF WATER REMOVE CONTAMINATED CLOTHING IF SYMPTOMS OR IRRITATION OCCUR CALL A PHYSICIAN

INHALATION

MOVE PERSON TO FRESH AIR IF NOT BREATHING OR IF NO HEARTBEAT, GIVE ARTIFICIAL RESPIRATION OR CARDIOPULMONARY RESUSCITATION (CPR) IMMEDIATELY CALL A PHYSICIAN

INGESTION

DO NOT INDUCE VOMITING DO NOT GIVE LIQUIDS IMMEDIATELY CALL A PHYSICIAN

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION

LOCAL OR GENERAL EXHAUST REQUIRED IN ENCLOSED AREAS OR WITH INADEQUATE VENTILATION

PRODUCT NAME REGULAR UNLEADED GASOLINE
MARATHON MSDS NO 115MAR001

SECTION 6 - SPECIAL PROTECTION INFORMATION (CON'T)

RESPIRATORY PROTECTION

APPROVED ORGANIC VAPOR CHEMICAL CARTRIDGE OR SUPPLIED AIR RESPIRATORS SHOULD BE WORN FOR EXPOSURES EXCEEDING THE TLV OR STEL OBSERVE RESPIRATOR PROTECTION FACTOR CRITERIA CITED IN ANSI Z88 2 (1980)

PROTECTIVE GLOVES

NEOPRENE NITRILE OR PVA GLOVES FOR REPEATED OR PROLONGED SKIN EXPOSURE

OTHER PROTECTIVE EQUIPMENT

USE EXPLOSION-PROOF EQUIPMENT

SECTION 7 - SPILL OR LEAK PROCEDURES

ENVIRONMENTAL EFFECTS

LIQUID CAN BE TOXIC TO AQUATIC LIFE

STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE

KEEP PUBLIC AWAY SHUT OFF SOURCE IF POSSIBLE TO DO SO WITHOUT HAZARD ELIMINATE ALL IGNITION SOURCES ADVISE NATIONAL RESPONSE CENTER (800-424-8802) IF PRODUCT HAS ENTERED A WATERCOURSE ADVISE LOCAL AND STATE EMERGENCY SERVICES AGENCIES IF APPROPRIATE CONTAIN LIQUID WITH SAND OR SOIL RECOVER AND RETURN FREE LIQUID TO SOURCE USE SUITABLE SORBENTS TO CLEAN UP RESIDUAL LIQUIDS

WASTE DISPOSAL METHOD

DISPOSE OF CLEANUP MATERIALS IN ACCORDANCE WITH APPLICABLE LOCAL STATE AND FEDERAL REGULATIONS

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

USE APPROPRIATELY GROUNDED DISPENSING PRACTICES STORE IN A RELATIVELY COOL PLACE DO NOT EXPOSE TO HEAT OPEN FLAMES OR OXIDIZERS

SECTION 9 - HAZARD WARNING

DANGER!

EXTREMELY FLAMMABLE

HARMFUL OR FATAL IF SWALLOWED

CONTAINS BENZENE WHICH MAY CAUSE CANCER OR BE TOXIC TO BLOOD-FORMING ORGANS

PRODUCT NAME REGULAR UNLEADED GASOLINE
MARATHON MSDS NO 115MAR001

SECTION 10 - ADDITIONAL COMMENTS

SECTION 11 - ADDITIONAL COMMENTS CONTINUED

SECTION 12 - REGULATIONS

INFORMATION SUPPLIED BY: COORDINATOR TOXICOLOGY AND PRODUCT SAFETY
CRAIG M PARKER PHONE (419)422-2121

MSDS DATE 04/10/87 DATE OF PREVIOUS MSDS / /

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PRODUCT NAME REGULAR LEADED GASOLINE
MARATHON MSDS NO 116MAR001

- FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME REGULAR LEADED GASOLINE

SYNONYMS
GASOLINE REGULAR LEADED LEADED REGULAR
GASOLINE MILE-MAKER GASOLINE REGULAR
LEADED GASOLINE

MANUFACTURER / DISTRIBUTOR
MARATHON PETROLEUM COMPANY
539 SOUTH MAIN STREET
FINDLAY, OH
45840
EMERGENCY PHONE NUMBERS
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY PETROLEUM HYDROCARBON CAS NO MIXTURE
CHEMICAL FORMULA MIXTURE PRODUCT CODE

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
90-437 F	N A F	0 71-0 77
% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
NEGLIGIBLE	3-4	414-776 MM HG @ 100F

PH INFORMATION PH N A AT CONC
APPEARANCE AMBER LIQUID ODOR GASOLINE ODOR

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
0 F	C A 495 F	LOWER/UPPER 1 4/ 7 6

EXTINGUISHING MEDIA

ONLY U L APPROVED CLASS B FIRE EXTINGUISHING MEDIA SUCH AS FOAM CO2 HALON 1211 OR DRY CHEMICAL WATER SPRAY SHOULD BE USED ONLY BY QUALIFIED FIRE FIGHTING PERSONNEL

SPECIAL FIRE FIGHTING INSTRUCTIONS

CAUTION MUST BE FOLLOWED AFTER EXTINGUISHMENT DUE TO EASE OF REIGNITION OF HOT GASOLINE VAPORS WATER CAN BE USED TO COOL EXPOSED SURFACES

STABILITY THE MATERIAL IS STABLE AT 70 F 760MM PRESSURE
CONDITIONS TO AVOID

HAZARDOUS DECOMPOSITION PRODUCTS
CARBON MONOXIDE ALDEHYDES, AROMATIC HYDROCARBONS, LEAD COMPOUNDS

INCOMPATIBLE MATERIALS
OXIDIZERS

HAZARDOUS POLYMERIZATION WILL NOT OCCUR

PRODUCT NAME REGULAR LEADED GASOLINE
MARATHON MSDS NO 116MAR001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

ADDITIONAL TOXICITY INFORMATION

TWO YEAR INHALATION TOXICITY STUDIES WITH FULLY VAPORIZED GASOLINE (67,292 & 2056 PPM) PRODUCED KIDNEY DAMAGE & KIDNEY TUMORS IN MALE RATS BUT NOT IN FEMALE RATS OR MALE AND FEMALE MICE FEMALE MICE DEVELOPED A SLIGHTLY HIGHER INCIDENCE OF LIVER TUMORS COMPARED TO CONTROLS AT THE HIGHEST EXPOSURE LEVEL SINCE THESE RESPONSES ARE SPECIES SPECIFIC AND HAVE NOT BEEN OBSERVED IN HUMANS, THEIR BIOLOGIC SIGNIFICANCE AS IT RELATES TO HUMAN HEALTH IS DIFFICULT TO INTERPRET AT THIS TIME THE AMERICAN PETROLEUM INSTITUTE IS CURRENTLY CONDUCTING STUDIES TO HELP ANSWER THESE QUESTIONS CHRONIC HUMAN HEALTH EFFECTS WOULD NOT BE EXPECTED AS LONG AS GOOD PERSONAL HYGIENE AND PROPER SAFETY PRECAUTIONS ARE PRACTICED

PROLONGED AND REPEATED OVEREXPOSURE TO BENZENE MAY PRODUCE INJURY TO THE BLOOD FORMING TISSUES CAUSING BLOOD ABNORMALITIES AND POSSIBLY LEUKEMIA HOWEVER EXPOSURES TO SUCH HIGH LEVELS ARE NOT LIKELY TO BE ENCOUNTERED IN TYPICAL GASOLINE HANDLING OPERATIONS DUE TO THE COMPARATIVELY LOW BENZENE CONTENT

EMERGENCY FIRST AID PROCEDURES

EYE

FLUSH EYES WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES IF SYMPTOMS OR IRRITATION OCCUR, CALL A PHYSICIAN

SKIN

WASH WITH SOAP AND LARGE AMOUNTS OF WATER REMOVE CONTAMINATED CLOTHING IF SYMPTOMS OR IRRITATION OCCUR CALL A PHYSICIAN

INHALATION

MOVE PERSON TO FRESH AIR IF NOT BREATHING OR IF NO HEARTBEAT GIVE ARTIFICIAL RESPIRATION OR CARDIOPULMONARY RESUSCITATION (CPR) IMMEDIATELY CALL A PHYSICIAN

INGESTION

DO NOT INDUCE VOMITING DO NOT GIVE LIQUIDS CALL A PHYSICIAN

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION

LOCAL OR GENERAL EXHAUST REQUIRED IN ENCLOSED AREAS OR WITH INADEQUATE VENTILATION

PRODUCT NAME REGULAR LEADED GASOLINE
MARATHON MSDS NO 116MAR001

ECTION 6 - SPECIAL PROTECTION INFORMATION (CON'T)

RESPIRATORY PROTECTION

APPROVED ORGANIC VAPOR CHEMICAL CARTRIDGE OR SUPPLIED AIR RESPIRATORS SHOULD BE WORN FOR EXPOSURES EXCEEDING THE TLV OR STEL OBSERVE RESPIRATOR PROTECTION FACTOR CRITERIA CITED IN ANSI Z88 2 (1980)

PROTECTIVE GLOVES

NEOPRENE, NITRILE OR PVA GLOVES FOR REPEATED OR PROLONGED SKIN EXPOSURE

OTHER PROTECTIVE EQUIPMENT

USE EXPLOSION-PROOF EQUIPMENT

SECTION 7 - SPILL OR LEAK PROCEDURES

ENVIRONMENTAL EFFECTS

LIQUID CAN BE TOXIC TO AQUATIC LIFE

STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE

KEEP PUBLIC AWAY SHUT OFF SOURCE OF LEAK IF POSSIBLE TO DO SO WITHOUT HAZARD ELIMINATE ALL IGNITION SOURCES ADVISE NATIONAL RESPONSE CENTER (800-424-8802) IF PRODUCT HAS ENTERED A WATER COURSE ADVISE LOCAL AND STATE EMERGENCY SERVICES AGENCIES IF APPROPRIATE CONTAIN LIQUID WITH SAND OR SOIL RECOVER AND RETURN FREE LIQUID TO SOURCE USE SUITABLE SORBENTS TO CLEAN UP RESIDUAL LIQUID

WASTE DISPOSAL METHOD

DISPOSE OF CLEANUP MATERIALS IN ACCORDANCE WITH APPLICABLE LOCAL STATE AND FEDERAL REGULATIONS

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

USE APPROPRIATELY GROUNDED DISPENSING PRACTICES STORE IN A RELATIVELY COOL PLACE DO NOT EXPOSE TO HEAT, OPEN FLAMES OR OXIDIZERS

PRODUCT NAME REGULAR LEADED GASOLINE
MARATHON MSDS NO 116MAR001

SECTION 9 - HAZARD WARNING

DANGER!

EXTREMELY FLAMMABLE

HARMFUL OR FATAL IF SWALLOWED

CONTAINS BENZENE WHICH MAY CAUSE
CANCER OR BE TOXIC TO BLOOD-FORMING ORGANS

SECTION 10 - ADDITIONAL COMMENTS

INFORMATION SUPPLIED BY COORDINATOR TOXICOLOGY AND PRODUCT SAFETY
CRAIG M PARKER PHONE (419)422-2121

MSDS DATE 04/10/87 DATE OF PREVIOUS MSDS / /

*** DISCLAIMER ***

THIS INFORMATION RELATES ONLY TO THE SPECIFIC MATERIAL DESIGNATED AND MAY NOT BE VALID FOR SUCH MATERIAL USED IN COMBINATION WITH ANY OTHER MATERIALS OR IN ANY PROCESS SUCH INFORMATION IS, TO THE BEST OF MARATHON PETROLEUM COMPANY'S KNOWLEDGE AND BELIEF ACCURATE AND LIABLE AS OF THE DATE INDICATED HOWEVER, NO REPRESENTATION, WARRANTY OR GUARANTEE IS MADE AS TO ITS ACCURACY RELIABILITY OR COMPLETENESS IT IS THE USER'S RESPONSIBILITY TO SATISFY HIMSELF AS TO THE SUITABLENESS AND COMPLETENESS OF SUCH INFORMATION FOR HIS OWN PARTICULAR USE

MATERIAL SAFETY DATA SHEET

MSDS NUMBER ▶ 71,630-6 PAGE 1

97367 14 85

24 HOUR EMERGENCY ASSISTANCE	GENERAL MSDS ASSISTANCE
SHELL 713-473-9461 CHEMTREC 800-424-9300	SHELL 713-241-4819

ACUTE HEALTH	FIRE	REACTIVITY	HAZARD RATING ▶
1	1	0	LEAST 0 SLIGHT 1 MODERATE 2 HIGH 3 EXTREME 4

*For acute and chronic health effects refer to the discussion in Section III

BE SAFE
READ OUR PRODUCT SAFETY INFORMATION AND PASS IT ON

SECTION I	NAME
PRODUCT ▶	SHELL ROTELLA(R) T MULTIGRADE 15W/40
CHEMICAL NAME ▶	MIXTURE (SEE SECTION II-A)
CHEMICAL FAMILY ▶	PETROLEUM HYDROCARBON MOTOR OIL
SHELL CODE ▶	50012

SECTION II-A PRODUCT/INGREDIENT

NO	COMPOSITION	CAS NUMBER	PERCENT
P	SHELL ROTELLA T MULTIGRADE 15W/40	MIXTURE	100
1	SOL REF HYDROTREATED HEAVY PARAFFINIC DIST	64742 54 7	35 80
2	SOL REF HYDROTREATED RESIDUAL OIL	64742-57-0	10 15
3	ADD TIVE PACKAGE	MIXTURE	30 40

SECTION II B ACUTE TOXICITY DATA

NO	ACUTE ORAL LD50	ACUTE DERMAL LD50	ACUTE INHALATION LC50
P	NOT AVAILABLE		

BASED UPON DATA AVAILABLE TO SHELL COMPONENT 3 IN THIS PRODUCT IS NOT HAZARDOUS UNDER OSHA HAZARD COMMUNICATION (29 CFR 1910 1200)

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
LUBRICATING OILS ARE GENERALLY CONSIDERED NO MORE THAN MINIMALLY IRRITATING TO THE EYES

SKIN CONTACT
LUBRICATING OILS ARE GENERALLY CONSIDERED NO MORE THAN MILDLY IRRITATING TO THE SKIN PROLONGED AND REPEATED CONTACT MAY RESULT IN VARIOUS SKIN DISORDERS SUCH AS DERMATITIS FOLLICULITIS OR OIL ACNE

INHALATION
INHALATION OF VAPOR (GENERATED AT HIGH TEMPERATURES ONLY) OR OIL MIST FROM THIS PRODUCT MAY RESULT IN MILD IRRITATION OF THE UPPER RESPIRATORY TRACT

INGESTION
LUBRICATING OILS ARE GENERALLY CONSIDERED NO MORE THAN SLIGHTLY TOXIC IF SWALLOWED

SIGNS AND SYMPTOMS
IRRITATION AS NOTED ABOVE

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

OTHER HEALTH EFFECTS
THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER HAS DETERMINED THERE IS SUFFICIENT EVIDENCE FOR THE CARCINOGENICITY IN EXPERIMENTAL ANIMALS OF USED MOTOR OILS HANDLING PROCEDURES AND SAFETY PRECAUTIONS IN THE MSDS SHOULD BE FOLLOWED TO MINIMIZE EMPLOYEE S EXPOSURE TO THE USED PRODUCT

SECTION IV OCCUPATIONAL EXPOSURE LIMITS

	OSHA		ACGIH		OTHER
ID	PEL/TWA	PEL/CEILING	TLV/TWA	TLV/STEL	
O	5 MG/M3*	NONE	5 MG/M3	10 MG/M3	

OIL MIST MINERAL

SECTION V EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT
FLUSH WITH WATER FOR 15 MINUTES WHILE HOLDING EYELIDS OPEN GET MEDICAL ATTENTION

SKIN CONTACT
REMOVE CONTAMINATED CLOTHING AND WIPE EXCESS OFF WASH WITH SOAP AND WATER OR A WATERLESS HAND CLEANER FOLLOWED BY SOAP AND WATER IF IRRITATION OCCURS GET MEDICAL ATTENTION

INHALATION
REMOVE VICTIM TO FRESH AIR AND PROVIDE OXYGEN IF BREATHING IS DIFFICULT GET MEDICAL ATTENTION

INGESTION
DO NOT INDUCE VOMITING IN GEN RAL NO TREATMENT IS NECESSARY UNLESS LARGE QUANTITIES OF PRODUCT HAVE INGESTED HOWEVER GET MED.CAL ATTENTION

NOTE TO PHYSICIAN
IN GENERAL EMESIS INDUCTION IS UNNECESSARY IN HIGH VISCOSITY LOW VOLATILITY PRODUCTS I E MOST OILS AND GREASES

SECTION VI SUPPLEMENTAL HEALTH INFORMATION

NONE IDENTIFIED

SECTION VII PHYSICAL DATA

BOILING POINT (DEG F)	NOT AVAILABLE	SPECIFIC GRAVITY (H2O 1)	0 8871	VAPOR PRESSURE (MM HG)	NOT AVAILABLE
MELTING POINT (DEG F)	-20 (POUR POINT)	SOLUBILITY (IN WATER)	NEGLIGIBLE	VAPOR DENSITY (AIR 1)	NOT AVAILABLE

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 JUNE 21 1989

SHELL OIL COMPANY
ENVIRONMENTAL AFFAIRS
P O BOX 4320
HOUSTON TX 77210

FOR ADDITIONAL INFORMATION ON THIS ENVIRONMENTAL DATA PLEASE CALL
(713) 241-2252

FOR EMERGENCY ASSISTANCE PLEASE CALL
SHELL (713) 473-9461
CHEMTREC (800) 424-9300

FOR

SODIUM BICARBONATE

- CONTENTS -

M A T E R I A L S A F E T Y D A T A S H E E T

STAUFFER CHEMICAL COMPANY Division of RHONE-POULENC INC
1 Corporate Drive Box 881 Shelton, Conn 06484
24-HOUR EMERGENCY TELEPHONE CHEMTREC 1-800-424-9300

Effective Date MAR 1, 1989 Date Printed MAR 7, 1989

PRODUCT NAME SODIUM BICARBONATE

I IDENTIFICATION

CHEMICAL NAME OF PRIMARY COMPONENT Sodium bicarbonate

FORMULA CHO3 Na MOLECULAR WEIGHT 84 00

SYNONYMS Baking soda, bicarbonate of soda, sodium acid carbonate, sodium hydrogen carbonate, carbonic acid monosodium salt

CAS # & NAME 144-55-8 Carbonic acid monosodium salt

II INGREDIENTS/SUMMARY OF HAZARDS

INGREDIENT(S)	CAS Number	OSHA Hazardous (H)/ Non-Hazardous (NH)	Percent
(1) Sodium bicarbonate	144-55-8	NH	100

NATIONAL FIRE PROTECTION ASSOCIATION RATING (Recommended by Stauffer)

KEY	Health
	0
4=Extreme	
3=High	Fire
2=Moderate	0
1=Slight	
0=Minimum	Reactivity
	0

SARA TITLE III HAZARD CLASSIFICATION

Immediate (acute) Health	NO
Delayed (chronic) Health	NO
Fire	NO
Sudden Release of Pressure	NO
Reactive	NO

(continued on Page 2)

MATERIAL SAFETY DATA SHEET

STAUFFER CHEMICAL COMPANY Division of RHONE-POULENC INC
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Effective Date MAR 1, 1989 Date Printed MAR 7, 1989

PRODUCT NAME SODIUM BICARBONATE

III PHYSICAL DATA

BULK DENSITY	45-65 lbs/cubic foot
BOILING POINT, 760 mm Hg, Degrees C (F)	Decomposes
MELTING POINT, Degrees C (F)	Not applicable
DECOMPOSITION POINT	Loses CO2 @ 270 C (518F)
VAPOR PRESSURE	Not applicable
VAPOR DENSITY (air=1)	Not applicable
pH	8 0 (1% solution)
SOLUBILITY IN WATER, @ 20 Degrees C	9 6 g/100g
APPEARANCE AND ODOR	White granular solid, odorless

For Technical Service Call 1-800-343-8324

IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT Degrees C (F) Noncombustible

FLAMMABLE LIMITS IN AIR Not applicable

AUTOIGNITION TEMPERATURE Degrees C (F) Not applicable

EXTINGUISHING MEDIA Not combustible This material is used as a dry powder extinguishing agent suitable for all classes of fires

UNUSUAL FIRE AND EXPLOSION HAZARDS
If extremely large quantities are involved, significant levels of carbon dioxide may be generated making necessary the use of self-contained breathing apparatus (Carbon dioxide is an asphyxiant at levels >5%) Soda ash, another decomposition product existing at temperatures >200 F, is a respiratory and skin irritant

V REACTIVITY DATA

STABILITY
At ambient temperatures and atmospheric pressure, tends to evolove carbon dioxide slowly and abosrb moisture At elevated temperatures cabon dioxide and water are evolved

CONDITIONS TO AVOID
Mositure and heat sensitive

(continued on Page 3)

MATERIAL SAFETY DATA SHEET

STAUFFER CHEMICAL COMPANY Division of RHONE-POULENC INC
1 Corporate Drive Box 881 Shelton, Conn 06484
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Effective Date MAR 1, 1989 Date Printed MAR 7, 1989

PRODUCT NAME SODIUM BICARBONATE

V REACTIVITY DATA (continued)

MATERIALS TO AVOID

Decomposes weak acids releasing heat and forming salt, water and carbon dioxide

HAZARDOUS DECOMPOSITION PRODUCTS

When temperature is raised to 190 Degrees F and beyond, carbon dioxide gas will be released to the atmosphere The resulting dust may be irritating to the eyes, skin and respiratory tract

HAZARDOUS POLYMERIZATION

Will not occur

VI HEALTH HAZARD DATA/FIRST AID PROCEDURES

EXPOSURE LIMITS

Nuisance dust 10 mg/cubic meter TWA for total dust (ACGIH-TLV)
15 mg/cubic meter TWA for total dust (OSHA-PEL)
5 mg/cubic meter TWA for respirable dust (OSHA-PEL)

TOXICOLOGY DATA

Oral LD50 (rats)	>4220 mg/kg body weight	(1)
Dermal LD50 (rabbits)	No information available	
Inhalation LC50 (rats - 4 Hour Exposure)	No information available	
Skin Effects (human)	Mild irritant	(1)
Eye Effects (rabbits)	Mild irritant	(1)

CARCINOGENICITY, TERATOGENICITY, MUTAGENICITY

This product does not contain any ingredient designated by IARC, NTP, ACGIH or OSHA as a probable human carcinogen

EFFECTS OF SINGLE OVEREXPOSURE

Swallowing

Mildly toxic by ingestion
May cause nausea, vomiting, and abdominal pains
Doses over 5 g/kg body weight can cause alkalosis and expansion in extracellular fluid volume with edema

Skin Absorption

Application of large amounts to the skin may cause alkalosis

(continued on Page 4)

STAUFFER CHEMICAL COMPANY Division of RHONE POULENC INC
1 Corporate Drive Box 881 Shelton, Conn 06484
24-HOUR EMERGENCY TELEPHONE CHEMTREC 1-800-424-9300

Effective Date MAR 1, 1989 Date Printed MAR 7, 1989

PRODUCT NAME SODIUM BICARBONATE

VI HEALTH HAZARD DATA/FIRST AID PROCEDURES (continued)

Inhalation
May cause cough and mild respiratory irritation

Skin Contact
May cause mild skin irritation

Eye Contact
Causes mild eye irritation

EFFECTS OF REPEATED OVEREXPOSURE
Repeated exposure may lead to contact dermatitis
Prolonged contact with dusts or vapors may cause conjunctivitis

OTHER EFFECTS OF OVEREXPOSURE
No evidence of additional adverse effects from available information

EXISTING MEDICAL CONDITIONS POSSIBLY AGGRAVATED BY EXPOSURE
Skin irritation may be aggravated in persons with existing skin lesions
Breathing of dust may aggravate acute or chronic asthma and inflammatory or fibrotic pulmonary disease

EMERGENCY AND FIRST AID PROCEDURES

Remove the patient from immediate source of exposure and assure that the individual is breathing If not breathing, use cardio-pulmonary resuscitation or artificial respiration GET MEDICAL ATTENTION

Swallowing
If patient is conscious and alert, give 2-3 glasses of water or milk to drink If available, give one tablespoon of Syrup of Ipecac to induce vomiting If vomiting has not occurred in 20 minutes, the same dose of Syrup of Ipecac may be repeated one additional time Alternatively, induce vomiting by touching back of throat with finger Do not make an unconscious person vomit GET MEDICAL ATTENTION

Skin
Immediately wash skin with plenty of soap and water, while removing contaminated clothing and shoes Wash clothing separately before reuse

Inhalation
Remove victim to fresh air If not breathing, administer cardio-pulmonary resuscitation or artificial respiration If breathing is difficult, administer oxygen GET MEDICAL ATTENTION

(continued on Page 5)

STAUFFER CHEMICAL COMPANY Division of RHONE-POULENC INC
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24-HOUR EMERGENCY TELEPHONE CHEMTREC 1-800-424-9300

Effective Date MAR 1, 1989 Date Printed MAR 7, 1989

PRODUCT NAME SODIUM BICARBONATE

VI HEALTH HAZARD DATA/FIRST AID PROCEDURES (continued)

Eyes
Hold eyelids open and flush with a steady, gentle stream of water for at least 15 minutes GET MEDICAL ATTENTION if irritation occurs

NOTES TO PHYSICIAN

No specific antidote is available

Treat symptomatically Consideration should be given to the possibility that overexposure to materials other than this product may have occurred

Large doses, particularly in patients with renal insufficiency, may produce systemic alkalosis and/or expansion in the extracellular fluid volume with edema

VII PRECAUTIONS FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED
To the extent possible, clean up spillage using shovels Scoop up loose material and place it in appropriate containers
If spilled on the ground, the affected area should be scraped clean and the material placed in an appropriate container for disposal
Wear appropriate protective clothing and equipment (see below) during cleanup activities

WASTE DISPOSAL METHOD
Dispose of in accordance with local, state and federal regulations

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Material is generally regarded as safe (GRAS) for humans and animals

Store in a cool, dry place in tightly closed containers away from acids Long storage may result in caking

(continued on Page 6)

MATERIAL SAFETY DATA SHEET

STAUFFER CHEMICAL COMPANY Division of RHONE-POULENC INC
1 Corporate Drive Box 881 Shelton, Conn 06484
24-HOUR EMERGENCY TELEPHONE CHEMTREC 1-800-424-9300

Effective Date MAR 1, 1989 Date Printed MAR 7, 1989

PRODUCT NAME SODIUM BICARBONATE

VIII SPECIAL PROTECTION INFORMATION

PROTECTIVE EQUIPMENT SHOULD BE USED DURING THE FOLLOWING PROCEDURES
- Manufacture or formulation of this product
- Repair and maintenance of contaminated equipment
- Clean-up of leaks and spills

RESPIRATORY PROTECTION Use NIOSH/MSHA approved respirator for dusts when handling spills or leaks, or when airborne concentrations are high

VENTILATION Local exhaust ventilation, when necessary

PROTECTIVE CLOTHING Work uniform, chemical-resistant gloves and boots

EYE PROTECTION Safety glasses with side shields

OTHER PROTECTIVE EQUIPMENT Maintain a sink, safety shower, eyewash fountain in work area Have oxygen readily available

IX REGULATORY STATUS

TSCA Inventory Status	TSCA Certified
Transportation Status	Not regulated
SARA Title III	
Section 302 Extremely Hazardous Substance List	Not listed
Section 313 Toxic Chemicals	Not listed
Reportable Quantity (RQ), under U S EPA CERCLA	Not listed
RCRA Hazardous Waste	Not listed
California Proposition 65	Not listed

X REFERENCES

(1) RTECS, 77865, 1985-86

The information herein is given in good faith
but no warranty, expressed or implied, is made

SUPERIOR CHEMICAL PRODUCTS CO
220 Hubbard Road
Youngstown Ohio 44503
(216) 744 4151

General Chemical

PRODUCT SAFETY DATA SHEET

SODA ASH

A. GENERAL INFORMATION

TRADE NAME (COMMON NAME)	☒ CAS NO ☐ GENERAL PRODUCT CODE #
Soda Ash	497 19 8

CHEMICAL NAME AND/OR SYNONYM
Sodium Carbonate

FORMULA	MOLECULAR WEIGHT
Na_2CO_3	105 99

ADDRESS (No STREET CITY STATE AND ZIP CODE)
GENERAL CHEMICAL CORPORATION
90 East Halsey Road
Parsippany N J 07054

CONTACT	PHONE NUMBER	LAST ISSUE DATE	CURRENT ISSUE DATE
Manager of Product Safety	(201) 515 1840	Sept 1986	June 1989

B. FIRST AID MEASURES

EMERGENCY PHONE NUMBER
(800) 631 8050

SKIN Wash with plenty of water

EYES Flush with plenty of water for at least 15 minutes and get medical attention

INGESTION Drink large quantities of water to dilute the material Do not induce vomiting

INHALATION Remove to fresh air

Get medical attention for irritation ingestion or discomfort from inhalation

C. HAZARDS INFORMATION

HEALTH

INHALATION
Inhalation of product dust may irritate nose throat and lungs

INGESTION
Although low in toxicity ingestion can be harmful consult a physician
May irritate mouth esophagus stomach etc. LD_{50} (rat) 2 8 gm/kg See reference (a)

SKIN
May cause skin irritation from prolonged contact

EYES
May irritate or burn eyes

PERMISSIBLE CONCENTRATION AIR (SEE SECTION J)		BIOLOGICAL
No TLV established	None established	None

UNUSUAL CHRONIC TOXICITY
None known

F. PHYSICAL DATA

MATERIAL IS (AT NORMAL CONDITIONS)	APPEARANCE AND ODOR	
☐ LIQUID ☒ SOLID ☐ GAS ☐ _____	White powder Odorless	
BOILING POINT ° C MELTING POINT 854 ° C	SPECIFIC GRAVITY (H20 1) 2 533	VAPOR DENSITY (AIR 1) NA
SOLUBILITY IN WATER (% by Weight) 17% solution at 20 °C	pH 1% solution pH = 11 3	VAPOR PRESSURE (mm Hg at 20 C) ☐ (PSIG) ☐ NA
EVAPORATION RATE (Butyl Acetate 1) ☐ (Ether 1) ☐ NA	% VOLATILES BY VOLUME (At 20 C) NA	

G. REACTIVITY DATA

STABILITY	CONDITIONS TO AVOID
☐ UNSTABLE ☒ STABLE	None

INCOMPATIBILITY (MATERIALS TO AVOID)

Contact with acids will release carbon dioxide gas
When mixed with lime dust and water corrosive caustic soda may be produced

HAZARDOUS DECOMPOSITION PRODUCTS

See above

HAZARDOUS POLYMERIZATION	CONDITIONS TO AVOID
☐ MAY OCCUR ☒ WILL NOT OCCUR	None

H. HAZARDOUS INGREDIENTS (Mixtures Only)

MATERIAL OR COMPONENT / C.A.S. #	WT. %	HAZARD DATA (SEE SECT. J)
NA		

PROPRIETARY TRADE SECRET

Material Safety Data Sheet
From Genium's Reference Collection
Genium Publishing Corporation
1145 Catalyn Street
Schenectady NY 12303 1836 USA
(518) 377 8855

GENIUM PUBLISHING CORP

No 50
SULFUR
(Revision A)
Issued October 1979
Revised August 1988

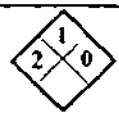
SECTION 1 MATERIAL IDENTIFICATION

Material Name SULFUR

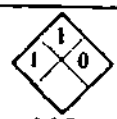
Description (Origin/Uses) Used in manufacturing sulfuric acid carbon disulfide sulfites insecticides plastics enamels metal glass cements in vulcanization and synthesis of rubber in making gunpowder and matches for bleaching wood pulp straw wool silk, felt, and linen

Other Designations Brimstone S CAS No 7704 34 9

Manufacturer Contact your supplier or distributor Consult the latest edition of the *Chemicalweek Buyers Guide* (Genium ref 73) for a list of suppliers



NFPA Fire



NFPA Nonfire

HMIS		NFPA	
H	1		
F	1	R	1
R	1	I	2
PPG*		S	2
*See sect 8		K	1

SECTION 2 INGREDIENTS AND HAZARDS

Sulfur CAS No 7704 34 9	%	EXPOSURE LIMITS
	Ca 100	**Toxicity Data*** Human Eye Irritation 8 ppm

*See NIOSH, *RTECS* (No WS4250000) for additional data

Comments Powdered sulfur may be considered a nuisance dust per the ACGIH If this classification applies to your work environment, follow the TLV TWA of 10 mg/m³ for total dust containing no asbestos and less than 1% crystalline silica

SECTION 3 PHYSICAL DATA

Melting Point >212 F (100 C)
Specific Gravity (H_2O = 1) Ca 2
Water Solubility (%) Insoluble
Molecular Weight 32 Grams/Mole

Appearance and Odor Yellow crystals, granules powders sticks lumps etc pure sulfur is odorless and tasteless Sulfur exists in different forms (allotropes) that have slightly different physical properties

SECTION 4 FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temperature	Flammability Limits in Air	LOWER	UPPER
*	*	% by Volume	*	

Extinguishing Media Sulfur is a combustible solid Use a water fog or mist to fight sulfur fires this will lessen the possibility of formation of a sulfur dust cloud Applying a direct water spray is not recommended because it may scatter molten sulfur and dust Steam and carbon dioxide may be useful in special cases

Unusual Fire or Explosion Hazards Sulfur dust particles suspended in air can explode especially if they are in contact with oxidizing agents Should a sulfur dust cloud form, immediately eliminate all possible sources of ignition (sparks open flame etc) and take appropriate precautions such as spraying the affected area with a water mist or fog When powdered sulfur is exposed to heat or sources of ignition, it is a weak fire and explosion hazard its solid metallic form is even less reactive

Special Fire fighting Procedures Wear a self contained breathing apparatus (SCBA) with a full facepiece operated in the pressure demand or positive pressure mode

SECTION 5 REACTIVITY DATA

Sulfur is stable in closed containers at room temperature under normal storage and handling conditions It does not undergo hazardous polymerization

Chemical Incompatibilities This material is a very reactive metal especially in its powdered form Hazardous reactions are reported between sulfur and aluminum, nitrates chlorates charcoal bromates iodates and others See Genium reference 84 (pp 491M 202 to 491M 205) as well as the references cited in section 9 for a complete list of these hazardous reactions

Conditions to Avoid Avoid contact with incompatible chemicals and exposure to sources of ignition like heat sparks etc Do not create dusty working conditions

Hazardous Products of Decomposition Toxic sulfur dioxide gas (SO_2) is produced during sulfur fires

SECTION 6 HEALTH HAZARD INFORMATION

Sulfur is not listed as a carcinogen by the NTP IARC NIOSH ACGIH or OSHA

Summary of Risks This material is very low in vapor pressure and toxicity Sulfur dust can irritate the mucous membranes of the respiratory tract and the inner surface of the eyelids For some individuals skin sensitization may occur from repeated skin contact with sulfur

Medical Conditions Aggravated by Long Term Exposure None reported **Target Organs** Eyes skin

Primary Entry Inhalation skin or eye contact **Acute Effects** Irritation of the skin eyes and mucous membranes

Chronic Effects Possible skin sensitization reactions

FIRST AID

Eyes Immediately flush eyes including under the eyelids gently but thoroughly with plenty of running water for at least 15 minutes

Skin Wash the affected area with soap and water

Inhalation Remove the exposed person to fresh air restore and/or support his or her breathing as needed

Ingestion Never give anything by mouth to someone who is unconscious or convulsing If the exposed person is responsive induce vomiting This is most effective within 30 minutes of ingestion

GET MEDICAL HELP (IN PLANT PARAMEDIC COMMUNITY) FOR ALL EXPOSURES Seek prompt medical assistance for further treatment observation and support after first aid Remove any worker who has allergic reactions to sulfur from further exposure consult with a physician before that worker is permitted to return to work in areas where exposure to sulfur is likely

SECTION 7 SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill/Leak Notify safety personnel, evacuate all nonessential personnel, and provide adequate ventilation Cleanup personnel need protection against contact with and inhalation of dust (see sect. 8) Scoop up spilled sulfur into suitable containers for disposal Carefully sweep or vacuum up small spills or residues without creating dust clouds

Waste Disposal Contact your supplier or a licensed contractor for detailed recommendations Follow Federal, state and local regulations

OSHA Designations
Air Contaminant (29 CFR 1910 1000 Subpart Z) Not Listed
EPA Designations (40 CFR 302 4) Not Listed

SECTION 8 SPECIAL PROTECTION INFORMATION

Goggles Always wear protective eyeglasses or chemical safety goggles Follow OSHA eye and face protection regulations (29 CFR 1910 133) **Respirator** Consult the *NIOSH Pocket Guide to Chemical Hazards* for general recommendations on respirators Follow OSHA respirator regulations (29 CFR 1910 134) For emergency or nonroutine use (leaks or cleaning reactor vessels and storage tanks) wear an SCBA with a full facepiece operated in the pressure-demand or positive pressure mode **Warning** Air purifying respirators will *not* protect workers in oxygen-deficient atmospheres

Other Wear impervious gloves boots and aprons etc as required by the work environment to prevent prolonged or repeated skin contact **Ventilation** Install and operate general and local ventilation systems powerful enough to maintain airborne levels of sulfur below the exposure limit cited in section 2

Safety Stations Make eyewash stations washing facilities and safety showers available in areas of use and handling

Contaminated Equipment Contact lenses pose a special hazard soft lenses may absorb irritants and all lenses concentrate them. Particles can adhere to contact lenses and cause corneal damage Do *not* wear contact lenses in any work area

Comments Practice good personal hygiene always wash thoroughly after using this material Avoid transferring it from your hands to your mouth while eating drinking or smoking Do *not* eat, drink, or smoke in any work area Do not inhale sulfur dust.

SECTION 9 SPECIAL PRECAUTIONS AND COMMENTS

Storage/Segregation Store sulfur in a cool dry well ventilated area in closed containers away from sources of ignition and incompatible chemicals (see sect. 5)

Special Handling/Storage Build all storage facilities with an explosion relief design to minimize damages from possible dust cloud explosions Ground and bond all containers used in the shipping and transferring operations of bulk powdered sulfur

Engineering Controls To decrease sources of ignition of dust cloud explosions make all engineering systems of maximum explosion proof design

Transportation Data (49 CFR 172 101 2)
DOT Shipping Name Sulfur (Solid) or Sulfur (Molten)
DOT ID Nos UN1350 (Solid) UN2448 (Molten)
DOT Label None
DOT Hazard Class ORM-C
IMO Label Flammable Solid (Solid and Molten)
IMO Class 4 1 (Solid and Molten)

References 1 2 84 73 90 93

Prepared by PJ Igoe BS
Industrial Hygiene Review DJ Wilson CIH
Medical Review MJ Hardies MD

J T Baker Chemical Co
222 Red School Lane Phillipsburg N J 08865
24 Hour Emergency Telephone (201) 859 2151
Chemtrec # (800) 424 9300
National Response Center # (800) 424 8802

MATERIAL SAFETY DATA SHEET

SECTION I - PRODUCT IDENTIFICATION

Product Name	Sulfuric Acid
Formula	H_2SO_4
Formula Wt	98 08
CAS No	07664-93-9
NIOSH/RTECS No	WS5600000
Common Synonyms	Oil of Vitriol
Product Codes	5030 9691,9675,5340,9679,9687,9674,9686,9694,9681,9688,9673 5432,5137,9685,4802,9684,9683,5643,9680,5374

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA™ System

Laboratory Protective Equipment

Precautionary Label Statements

POISON! DANGER!
HARMFUL IF INHALED
CAUSES SEVERE BURNS
MAY BE FATAL IF SWALLOWED
REACTS VIOLENTLY WITH WATER

Do not get in eyes, on skin, on clothing
Do not breathe vapor Keep in tightly closed container Loosen closure cautiously Use with adequate ventilation Wash thoroughly after handling In case of spill neutralize with soda ash or lime and place in dry container

SECTION II - HAZARDOUS COMPONENTS

Component	%	CAS No
Sulfuric Acid	90-100	7664-93-9

Continued on Page 2

SECTION III - PHYSICAL DATA

Boiling Point	327°C (621°F)	Vapor Pressure(mmHg)	<0 3
Melting Point	-2°C (28°F)	Vapor Density(air=1)	3 4
Specific Gravity (H_2O=1)	1 84	Evaporation Rate (Butyl Acetate=1)	<1
Solubility(H_2O)	Complete (in all proportions)	% Volatiles by Volume	N/A
Appearance & Odor	Clear, colorless to light yellow, oily odorless liquid		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point N/A NFPA 704M Rating 3-0-2 W

Flammable Limits Upper - N/A % Lower - N/A %

Fire Extinguishing Media
Use dry chemical or carbon dioxide Do not use water

cial Fire-Fighting Procedures
Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece operated in positive pressure mode
Do not get water inside containers

Unusual Fire & Explosion Hazards
Reacts with most metals to produce hydrogen gas, which can form an explosive mixture with air
A violent exothermic reaction occurs with water Sufficient heat may be produced to ignite combustible materials

Toxic Gases Produced
sulfur dioxide

SECTION V - HEALTH HAZARD DATA

Threshold Limit Value (TLV/TWA) 1 mg/m^3 (ppm)

Permissible Exposure Limit (PEL) 1 mg/m^3 (ppm)

Toxicity LD_{50} (oral-rat)(mg/kg) - 2140

Carcinogenicity NTP No IARC No Z List No OSHA reg No

Continued on Page 3

SECTION V - HEALTH HAZARD DATA (Continued)

Effects of Overexposure

Inhalation of vapors may cause severe irritation of the respiratory system
Liquid may cause severe burns to skin and eyes
Ingestion is harmful and may be fatal
Ingestion may cause nausea and vomiting
Ingestion may cause severe burns to mouth, throat, and stomach May have adverse effect on kidney function and may be fatal
Chronic overexposure may result in lung damage

Medical Conditions Generally Aggravated By Exposure

None Identified

Routes Of Entry

inhalation, ingestion, eye contact, skin contact

Emergency and First Aid Procedures

CALL A PHYSICIAN
If swallowed, do NOT induce vomiting, if conscious, give water, milk, or milk of magnesia
If inhaled, remove to fresh air If not breathing, give artificial respiration If breathing is difficult, give oxygen
In case of contact, immediately flush eyes or skin with plenty of water fo at least 15 minutes while removing contaminated clothing and shoes
Wash clothing before re-use

SECTION VI - REACTIVITY DATA

Stability Stable Hazardous Polymerization Will not occur

Conditions to Avoid moisture, heat

Incompatibles water, most common metals, organic materials, strong reducing agents, combustible materials, strong bases, strong oxidizing agents

Decomposition Products oxides of sulfur

SECTION VII - SPILL AND DISPOSAL PROCEDURES

Steps to be taken in the event of a spill or discharge

Wear self-contained breathing apparatus and full protective clothing
Stop leak if you can do so without risk DO NOT use water
Neutralize spill and/or washings with soda ash or lime
With clean shovel, place material into clean, dry container and cover
Move container(s) from spill area

J T Baker Neutrasorb^{R} or Neutrasol^{R} Low Na+' acid neutralizers

Continued on Page 4

from our experience and data presented in various technical publications It is the user s responsibility to determine the suitability of this information for the adoption of necessary safety precautions We reserve the right to revise Material Safety Data Sheets periodically as new information becomes available

-- LAST PAGE --

Shell

MSDS NUMBER ▶ 60,050-4 PAGE

24 HOUR EMERGENCY ASSISTANCE	GENERAL MSDS ASSISTANCE
SHELL 713-473-9461 CHEMTREC 800-424-9300	SHELL 713-241-4819

HEALTH	FIRE	REACTIVITY	HAZARD RATING ▶
1	1	0	LEAST 0 SLIGHT 1 MODERATE 2 HIGH 3 EXTREME 4

*For acute and chronic health effects refer to the discussion in Section III

BE SAFE
READ OUR PRODUCT SAFETY INFORMATION AND PASS IT ON
THANK YOU

SECTION I NAME

PRODUCT ▶	SHELL TELLUS(R) OIL 32
CHEMICAL NAME ▶	MIXTURE (SEE SEC IIA)
CHEMICAL FAMILY ▶	PETROLEUM HYDROCARBON HYDRAULIC OIL
SHELL CODE ▶	65208

SECTION II-A PRODUCT/INGREDIENT

NO	COMPOSITION	CAS NUMBER	PERCENT
P	SHELL TELLUS OIL 32	MIXTURE	100
1	SOLVENT REFINED HYDROTREATED HEAVY PARAFFINIC DISTILLATE	64742-54 7	97 98
2	MINOR ADDITIVES	MIXTURE	<3

SECTION II-B ACUTE TOXICITY DATA

NO	ACUTE ORAL LD50	ACUTE DERMAL LD50	ACUTE INHALATION LC50
P	NOT AVAILABLE		

BASED UPON DATA AVAILABLE TO SHELL COMPONENT 2 IN THIS PRODUCT IS NOT HAZARDOUS UNDER OSHA HAZARD COMMUNICATION (29 CFR 1910 1200)

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
BASED ON COMPONENT INFORMATION PRODUCT IS PRESUMED TO BE PRACTICALLY NON-IRRITATING TO THE EYES

SKIN CONTACT
BASED ON COMPONENT INFORMATION PRODUCT IS PRESUMED TO BE PRACTICALLY NON-IRRITATING TO THE SKIN PROLONGED AND REPEATED CONTACT MAY RESULT IN SKIN DISORDERS SUCH AS DERMATITIS OIL ACNE OR FOLLICULITIS ACCIDENTAL RELEASE UNDER HIGH PRESSURE APPLICATIONS MAY RESULT IN INJECTION OF OIL INTO THE SKIN CAUSING LOCAL NECROSIS

INHALATION
THE INHALATION OF VAPORS (GENERATED AT HIGH TEMPERATURES ONLY) OR OIL MIST MAY CAUSE A MILD IRRITATION OF THE MUCOUS MEMBRANES OF THE UPPER RESPIRATORY TRACT

INGESTION
BASED ON COMPONENT INFORMATION PRODUCT IS NO MORE THAN SLIGHTLY TOXIC IF SWALLOWED

IGNS AND SYMPTOMS
RRITATION AS NOTED ABOVE NECROSIS MAY BE EVIDENCED BY DELAYED ONSET OF PAIN AND TISSUE DAMAGE A
FEW HOURS FOLLOWING HIGH PRESSURE INJECTION

GGRAVATED MEDICAL CONDITIONS
REEXISTING SKIN AND RESPIRATORY DISORDERS MAY BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT

SECTION IV OCCUPATIONAL EXPOSURE LIMITS

	OSHA		ACGIH		OTHER
O	PEL/TWA	PEL/CEILING	TLV/TWA	TLV/STEL	
P	*5 MG/M3	NONE	*5 MG/M3	*10 MG/M3	NONE

OIL MIST MINERAL

ECTION V EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT
LUSH EYES WITH WATER IF IRRITATION OCCURS GET MEDICAL ATTENTION

KIN CONTACT
REMOVE CONTAMINATED CLOTHING/SHOES WIPE EXCESS FROM SKIN FLUSH SKIN WITH WATER FOLLOW BY
WASHING WITH SOAP AND WATER IF IRRITATION OCCURS GET MEDICAL ATTENTION IF MATERIAL IS INJECTED
NDER THE SKIN GET MEDICAL ATTENTION PROMPTLY TO PREVENT SERIOUS DAMAGE DO NOT WAIT FOR SYMPTOMS
O DEVELOP

INHALATION
EMOVE VICTIM TO FRESH AIR AND PROVIDE OXYGEN IF BREATHING IS DIFFICULT GET MEDICAL ATTENTION

NGESTION
DO NOT INDUCE VOMITING IN GENERAL NO TREATMENT IS NECESSARY UNLESS LARGE QUANTITIES OF PRODUCT
ARE INGESTED HOWEVER GET MEDICAL ADVICE

E TO PHYSICIAN
IN GENERAL EMESIS INDUCTION IS UNNECESSARY IN HIGH VISCOSITY LOW VOLATILITY PRODUCTS I E MOST
OILS AND GREASES

SECTION VI SUPPLEMENTAL HEALTH INFORMATION

NONE IDENTIFIED

SECTION VII PHYSICAL DATA

BOILING POINT (DEG F)	NOT AVAILABLE	SPECIFIC GRAVITY (H2O=1)	0 8718	VAPOR PRESSURE (MM HG)	NOT AVAILABLE
MELTING POINT (DEG F)	-25 (POUR POINT)	SOLUBILITY (IN WATER)	NEGLIGIBLE	VAPOR DENSITY (AIR=1)	NOT AVAILABLE
EVAPORATION RATE (N-BUTYL ACETATE = 1)		NOT AVAILABLE		VIS CS = 30 32 @ 40 DEG C	

APPEARANCE AND ODOR CREAM WHITE LIQUID SLIGHT HYDROCARBON ODOR

SECTION VIII FIRE AND EXPLOSION HAZARDS

FLASH POINT AND METHOD
380 DEG F (PMCC)

FLAMMABLE LIMITS /% VOLUME IN AIR
LOWER N/AV UPPER N/AV

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
MATERIALS WILL NOT BURN UNLESS PREHEATED 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

SECTION IX REACTIVITY

STABILITY STABLE

HAZARDOUS POLYMERIZATION WILL NOT OCCUR

CONDITIONS AND MATERIALS TO AVOID
AVOID HEAT OPEN FLAMES AND OXIDIZING MATERIALS

HAZARDOUS DECOMPOSITION PRODUCTS
THERMAL DECOMPOSITION PRODUCTS ARE HIGHLY DEPENDENT ON THE COMBUSTION CONDITIONS A COMPLEX MIXTURE OF AIRBORNE SOLID LIQUID PARTICULATES AND GASES WILL EVOLVE WHEN THIS MATERIAL UNDERGOES PYROLYSIS OR COMBUSTION CARBON MONOXIDE AND OTHER UNIDENTIFIED ORGANIC COMPOUNDS MAY BE FORMED UPON COMBUSTION

SECTION X EMPLOYEE PROTECTION

RESPIRATORY PROTECTION
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 AND PARTICULATES

PROTECTIVE CLOTHING
WEAR CHEMICAL RESISTANT GLOVES AND OTHER PROTECTIVE CLOTHING AS REQUIRED TO MINIMIZE SKIN CONTACT NO SPECIAL EYE PROTECTION IS ROUTINELY NECESSARY TEST DATA FROM PUBLISHED LITERATURE AND/OR GLOVE AND CLOTHING MANUFACTURERS INDICATE THE BEST PROTECTION IS PROVIDED BY NITRILE GLOVES

SECTION XI ENVIRONMENTAL PROTECTION

SPILL OR LEAK PROCEDURES
MAY BURN ALTHOUGH NOT READILY IGNITABLE USE CAUTIOUS JUDGMENT WHEN CLEANING UP LARGE SPILLS LARGE SPILLS *** WEAR RESPIRATOR AND PROTECTIVE CLOTHING AS APPROPRIATE SHUT OFF SOURCE OF LEAK 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 DISPOSE OF PROPERLY FLUSH AREA WITH WATER TO REMOVE TRACE RESIDUE * SMALL SPILLS TAKE UP WITH AN ABSORBENT MATERIAL AND DISPOSE OF PROPERLY

WASTE DISPOSAL
PLACE IN AN APPROPRIATE DISPOSAL FACILITY IN COMPLIANCE WITH LOCAL REGULATIONS

ENVIRONMENTAL HAZARDS
THIS PRODUCT IS CLASSIFIED AS AN OIL UNDER SECTION 311 OF THE CLEAN WATER ACT SPILLS ENTERING (A) SURFACE WATERS OR (B) ANY WATERCOURSES OR SEWERS ENTERING/LEADING TO SURFACE WATERS THAT CAUSE A SHEEN MUST BE REPORTED TO THE NATIONAL RESPONSE CENTER 800-424-8802

MATERIAL SAFETY DATA SHEET

MSDS NUMBER ▶ 60,650-4 PAGE 1

9735 (4 8 1)

24 HOUR EMERGENCY ASSISTANCE	GENERAL MSDS ASSISTANCE
SHELL 713-473-9461 CHEMTREC 800-424-9300	SHELL 713-241-4819

ACUTE HEALTH	FIRE	REACTIVITY	HAZARD RATING ▶
1	1	0	LEAST 0 SLIGHT 1 MODERATE 2 HIGH 3 EXTREME 4

*For acute and chronic health effects refer to the discussion in Section III

BE SAFE
READ OUR PRODUCT SAFETY INFORMATION AND PASS IT ON

SECTION I	NAME
PRODUCT ▶	SHELL TELLUS(R) OIL 100
CHEMICAL NAME ▶	MIXTURE (SEE SEC IIA)
CHEMICAL FAMILY ▶	PETROLEUM HYDROCARBON HYDRAULIC OIL
SHELL CODE ▶	65214

SECTION II-A PRODUCT/INGREDIENT

NO	COMPOSITION	CAS NUMBER	PERCENT
P	SHELL TELLUS OIL 100	MIXTURE	100
1	SOLVENT REFINED HYDROTREATED HEAVY PARAFFINIC DISTILLATE	64742 54 7	0-98
2	SOLVENT REFINED HYDROTREATED ACID-TREATED HEAVY NAPHTHENIC DIST	64742 18 3	0-98
3	MINOR ADDITIVES	MIXTURE	<2

SECTION II-B ACUTE TOXICITY DATA

NO	ACUTE ORAL LD50	ACUTE DERMAL LD50	ACUTE INHALATION LC50
P	NOT AVAILABLE		

BASED UPON DATA AVAILABLE TO SHELL COMPONENT 3 IN THIS PRODUCT IS NOT HAZARDOUS UNDER OSHA HAZARD COMMUNICATION (29 CFR 1910 1200)

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INHALATION
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[ ]

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	OSHA		ACGIH		OTHER
)	PEL/TWA	PEL/CEILING	TLV/TWA	TLV/STEL	
[ ]	*5 MG/M3	NONE	*5 MG/M3	*10 MG/M3	NONE

OIL MIST MINERAL

[ ]

[ ]ION V EMERGENCY AND FIRST AID PROCEDURES

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[ ] AND GREASES

[ ]TION VI SUPPLEMENTAL HEALTH INFORMATION

[ ]NE IDENTIFIED

[ ]

[ ]

[ ]

[ ]ECTION VII PHYSICAL DATA

[ ]LING POINT (DEG F) NOT AVAILABLE
SPECIFIC GRAVITY (H2O=1) 0 8871
VAPOR PRESSURE (MM HG) NOT AVAILABLE

[ ] G POINT [ ]DEG F) -5 (POUR POINT)
SOLUBILITY (IN WATER) NEGLIGIBLE
VAPOR DENSITY (AIR 1) NOT AVAILABLE

[ ]

EVAPORATION RATE (N-BUTYL ACETATE = 1) NOT AVAILABLE VIS CS 94 98 @ 40 DEG C

APPEARANCE AND ODOR CREAM WHITE LIQUID SLIGHT HYDROCARBON ODOR

SECTION VIII FIRE AND EXPLOSION HAZARDS

FLASH POINT AND METHOD
405 DEG F (PMCC)

FLAMMABLE LIMITS /% VOLUME IN AIR
LOWER N/AV UPPER N/AV

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

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STABILITY STABLE HAZARDOUS POLYMERIZATION WILL NOT OCCUR

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SECTION XI ENVIRONMENTAL PROTECTION

SPILL OR LEAK PROCEDURES
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WASTE DISPOSAL
PLACE IN AN APPROPRIATE DISPOSAL FACILITY IN COMPLIANCE WITH LOCAL REGULATIONS

ENVIRONMENTAL HAZARDS
THIS PRODUCT IS CLASSIFIED AS AN OIL UNDER SECTION 311 OF THE CLEAN WATER ACT SPILLS ENTERING (A) SURFACE WATERS OR (B) ANY WATERCOURSES OR SEWERS ENTERING/LEADING TO SURFACE WATERS THAT CAUSE A

N MUST BE REPORTED TO THE NATIONAL RESPONSE CENTER 800 424 8802

TI XII SPECIAL PRECAUTIONS

IMIZE SKIN CONTACT WASH WITH SOAP AND WATER BEFORE EATING DRINKING SMOKING OR USING TOILET ILITIES LAUNDER CONTAMINATED CLOTHING BEFORE REUSE PROPERLY DISPOSE OF CONTAMINATED LEATHER ES INCLUDING SHOES THAT CANNOT BE DECONTAMINATED STORE IN A COOL DRY PLACE WITH ADEQUATE TILATION KEEP AWAY FROM OPEN FLAMES AND HIGH TEMPERATURES

TION XIII TRANSPORTATION REQUIREMENTS

PARTMENT OF TRANSPORTATION CLASSIFICATION NOT HAZARDOUS BY D O T REGULATIONS

ON XIV OTHER REGULATORY CONTROLS

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

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

TE PREPARED AUGUST 29 1985

JOHN P SEPESI

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

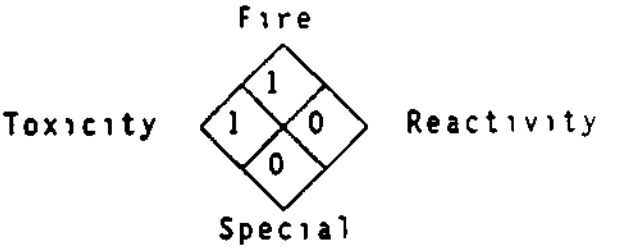
FE

WITCO MATERIAL SAFETY DATA SHEET

Kendall C-915 Grease PAGE 1

Product Code J63 7834

NFPA HAZARD RATING
4 - Extreme
3 - High
2 - Moderate
1 - Slight
0 - Insignificant



DIVISION AND LOCATION---SECTION I

Division KENDALL REFINING COMPANY
Location BRADFORD, PENNSYLVANIA
77 N KENDALL AVE ,BRADFORD PA 16701
Emergency Telephone Number (814) 368 6111
Transportation Emergency CHEM TREC 1-(800) 424 9300 (U S and Canada)

CHEMICAL AND PHYSICAL PROPERTIES---SECTION II

Chemical Name
petroleum hydrocarbon and calcium stearate
Formula not applicable
Hazardous Decomposition Products
carbon monoxide and carbon dioxide from burning
Incompatibility (Keep away from)
strong oxidizers such as hydrogen peroxide, bromine, and chromic acid
Toxic and Hazardous Ingredients
none
Form semi-solid Odor mineral oil
Appearance grease Color black
Specific Gravity (water=1) 94
Boiling Point greater than 260 C (500 F)
Melting Point not applicable
Solubility in Water (by weight %) negligible
Volatile (by weight %) negligible
Evaporation Rate negligible
Vapor Pressure (mm Hg at 20 C) negligible
Vapor Density (air=1) not applicable
pH (as is) not applicable
Stability Product is stable under normal conditions
Viscosity SUS at 100 F Greater than or = to 100

FIRE AND EXPLOSION DATA---SECTION III

Special Fire Fighting Procedures
Do not use water except as fog
Unusual Fire and Explosion Hazards
none

(Continued on next page)

(Section III continued)

Flashpoint (Method Used) ASTM D92 greater than 210 C (410 F)
Flammable limits % not applicable
Extinguishing agents
Drychemical or Waterfog or CO_2 or Foam or Sand/Earth
Water may cause frothing
Closed containers exposed to fire may be cooled with water

HEALTH HAZARD DATA---SECTION IV

Permissible concentrations (air)
not applicable
Chronic effects of overexposure
Extended skin contact may cause dermatitis to some individuals
Acute toxicological properties
no data available
Emergency First Aid Procedures
Eyes Immediately flush with large quantities of water for at least 15 minutes and call a physician
Skin Contact Remove excess with cloth or paper Wash thoroughly with soap and water
Inhalation Remove victim to fresh air Call a physician
If Swallowed Contact a physician immediately

SPECIAL PROTECTION INFORMATION---SECTION V

Ventilation Type Required (Local,mechanical,special)
none required
Respiratory Protection (Specify type)
none required
Protective Gloves
rubber
Eye Protection
chemical safety goggles
Other Protective Equipment
none

HANDLING OF SPILLS OR LEAKS---SECTION VI

Procedures for Clean-Up
Transfer bulk of mixture into another container Absorb residue with an inert material such as earth, sand, or vermiculite Sweep up and dispose as solid waste in accordance with local, state, and federal regulations
Waste Disposal
Dispose of in accordance with all applicable federal, state and local regulations

(Continued on next page)

SPECIAL PRECAUTIONS---SECTION VII

Precautions to be taken in handling and storage

Do not handle or store at temperatures over

Maximum Storage Temperature 38 C (100°F)

TRANSPORTATION DATA---SECTION VIII

D O.T. Not Regulated

R portable Quantity not applicable

F ght Classification Petroleum Lubricating Grease

Special Transportation Notes

Prepared by L D DROMGOLD

Title MANAGER,NEW PRODUCTS

Original Date	06/18/82	Sent to	CHRIS MCKEEMAN
Revision Date	11/13/85		OHM CORPORATION
Supersedes	05/11/84		16406 US ROUTE 224E
Date Sent	07/28/89		FINDLAY OH 45840

We believe the statements, technical information and recommendations contained herein are reliable, but they are given without warranty or guarantee of any kind, express or implied, and we assume no responsibility for any loss, damage, or expense, direct or consequential, arising out of their use

PREPARED 16 MAY 198=

Material Safety Data Sheet

CONFIDENTIAL

Manufacturer's Name J C WHITLAM MFG CO

Address P O BOX 71

WADSWORTH, OH 44281

Emergency Phone No (216) 334-2524

PRODUCT IDENTIFICATION

Chemical Name N/ A

Common Name N/A

Product Name T-U TYPE 555

CAS Number N/A

Chemical Formula N/A

Product Use THREAD SEALING COMPOUND

HAZARDOUS INGREDIENTS

Chemical Name	Common Name	CAS NO	%	OSHA PEL	ACGIH TLV TWA
ISOPROPYL ALCOHOL	N/A	00067630	10-15	N/A	400
BUTYL OXITOL		111-76-2	13-18		25

PHYSICAL DATA

Boiling Point (760mm Hg) N/A

Specific Gravity (Water = 1) 1.36

Vapor Pressure (mm Hg) N/A

% Non Volatile 25%

Vapor Density (AIR = 1) N/A

Evaporation Rate (Ether = 1) N/A

Solubility in Water SLIGHT

pH N/A

Appearance YELLOW-TAN PASTE

Odor SLIGHT

FIRE AND EXPLOSION HAZARD DATA

Flash Point 70 °F

Flammable Limits Lel N/A Uel N/A

Method Used TCC

Extinguishing Media

CARBON DIOXIDE OR DRY CHEMICAL OR WATER

Special Fire Fighting Procedures

NONE

Unusual Fire and Explosion Hazards

NONE

Hazardous Decomposition Products

NONE

HEALTH HAZARD DATA

Oral Toxicity

NON-TOXIC

Dermal Toxicity

NON-TOXIC

Eye

KEEP OUT OF EYES

Inhalation

POSSIBLE DIZZINESS

Chronic Toxicity

Mutagenesis

Effects of Overexposure

Ingestion	N/A
Skin Contact	N/A
Eye Contact	N/A
Inhalation	N/A

Acute Systemic Effects N/A

Chronic Systemic Effects N/A

EMERGENCY AND FIRST AID PROCEDURES

Eye Contact	FLUSH EYES WITH WATER
Skin Contact	APPLY SKIN LOTION WASH CLOTHING BEFORE REUSE
Inhalation	REMOVE TO WELL VENTILATED AREA
Ingestion	CALL PHYSICIAN

PREPARED 16 MAY 1986

Material Safety Data Sheet

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FIRE AND EXPLOSION HAZARD DATA

Flash Point 70 °F

Flammable Limits Lel N/A Uel N/A

Method Used TCC

Extinguishing Media

CARBON DIOXIDE OR DRY CHEMICAL OR WATER

Special Fire Fighting Procedures

NONE

Unusual Fire and Explosion Hazards

NONE

Hazardous Decomposition Products

NONE

REACTIVITY DATA

Stability ☒ Stable ☐ Unstable **Conditions to Avoid** LIQUID OXYGEN SYSTEMS

Incompatibility (Materials to Avoid)
LIQUID OXYGEN SYSTEMS

Can Hazardous Polymerization Occur NO

Hazardous Decomposition Products and Conditions N/A

SPILL OR LEAK PROCEDURES

Response to Small Spills FOLLOW NORMAL GOOD HOUSEKEEPING PROCEDURES

Response to Large Spills
SAME AS ABOVE

Hazards to be Avoided
N/A

Reportable Quantity N/A

Waste Classification N/A

Disposal Methods
N/A

SPECIAL PROTECTION INFORMATION

Respiratory Protection
AVOID PROLONGED BREATHING OF FUMES

For Hands Body
NONE

For Eyes
KEEP OUT OF EYES

Ventilation
NORMAL VENTILATION

SPECIAL PRECAUTIONS

Other Precautions
STORE AWAY FROM HEAT
CLOSE CONTAINER AFTER USE
KEEP OUT OF REACH OF CHILDREN

LABELING INFORMATION

DOT Shipping Name PIPE FITTING CEMENT
DOT Label NON-FLAMMABLE
UN No. NA

MATERIAL SAFETY DATA SHEET

WOLF'S HEAD
A DIVISION OF PENNZOIL PRODUCTS COMPANY

I PRODUCT IDENTIFICATION

Manufacturer's Name	WOLF'S HEAD OIL COMPANY	CAS Number	MIXTURE
		MSDS Code	000586
Address	P O BOX 808 OIL CITY, PENNSYLVANIA 163010808	NFPA Hazard Identification Degree of Hazard: Health 1, Fire 2, Reactivity 0 Hazard Ratings: 0 Least, 1 Slight, 2 Moderate, 3 High, 4 Extreme	
Emergency Telephone No	(713) 236-6070		
Trade Name	WOLF'S HEAD HIGH PERFORMANCE 2-CYCLE OIL		
Synonyms	PETROLEUM HYDROCARBON LUBRICANT		

II INGREDIENTS

COMPONENT NAME / CAS NUMBER	HAZARDOUS IN BLEND	PERCENTAGE MIN	PERCENTAGE MAX	COMPONENT EXPOSURE LIMITS			UNITS
DETERGENT/INHIBITOR SYSTEM				OSHA PEL			NO LIMIT
TRADE SECRET	NO	5 00 TO	10 00	ACGIH TLV			NO LIMIT
BASE LUBRICATING OILS				OSHA PEL			NO LIMIT
MIXTURE	NO	70 00 TO	75 00	ACGIH TLV			NO LIMIT
OIL SOLUBLE DYE				OSHA PEL			NO LIMIT
TRADE SECRET	NO	<	1 00	ACGIH TLV			NO LIMIT
POUR POINT DEPRESSANT				OSHA PEL			NO LIMIT
TRADE SECRET	NO	<	1 00	ACGIH TLV			NO LIMIT
STODDARD SOLVENT				OSHA PEL	TWA	525 0000	MG/M3
8052 41 3	YES	10 00 TO	20 00	ACGIH TLV	TWA	525 0000	MG/M3

BY ENVIRONMENTAL, SAFETY & HEALTH
(713) 546-8512

EFFECTIVE DATE JULY 03, 1989

DISCLAIMER OF WARRANTY

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REQUIRED UNDER USDL SAFETY AND HEALTH REGULATIONS FOR SHIP REPAIRING SHIPBUILDING AND SHIPBREAKING (29 CFR 1915, 1916 1917)

III. HEALTH EFFECT INFORMATION

EYE CONTACT

AVOID EYE CONTACT. THIS PRODUCT HAS NOT BEEN TESTED FOR ACUTE EYE HAZARDS. THIS PRODUCT MAY BE SLIGHTLY IRRITATING TO THE EYES UPON DIRECT CONTACT. EXPOSURE TO VAPORS GENERATED UNDER UNUSUAL CONDITIONS MAY BE MILDLY IRRITATING TO THE EYES

SKIN CONTACT

AVOID SKIN CONTACT. THIS PRODUCT MAY CAUSE SLIGHT SKIN IRRITATION UPON DIRECT CONTACT. PROLONGED OR REPEATED CONTACT MAY RESULT IN CONTACT DERMATITIS WHICH IS CHARACTERIZED BY DRYNESS, CHAPPING, AND REDDENING. THIS CONDITION MAY MAKE THE SKIN MORE SUSCEPTIBLE TO OTHER IRRITANTS, SENSITIZERS, AND DISEASE. PRE EXISTING SKIN CONDITIONS MAY MAKE THE SKIN MORE SUSCEPTIBLE AND FACILITATE UPTAKE BY THIS ROUTE. PROLONGED OR REPEATED CONTACT MAY RESULT IN OIL ACNE WHICH IS CHARACTERIZED BY BLACKHEADS WITH POSSIBLE SECONDARY INFECTION. CONSTITUENTS OF THIS PRODUCT HAVE BEEN ASSOCIATED WITH PHOTOSENSITIVITY, AN ABNORMAL SENSITIVITY OF SKIN TO SUNLIGHT. SEE HEALTH DATA SECTION BELOW

INHALATION

THIS PRODUCT HAS A LOW VAPOR PRESSURE AND IS NOT EXPECTED TO PRESENT AN INHALATION HAZARD AT AMBIENT CONDITIONS. CAUTION SHOULD BE TAKEN TO PREVENT AEROSOLIZATION OR MISTING OF THIS PRODUCT. EXPOSURE TO VAPORS GENERATED UNDER UNUSUAL CONDITIONS MAY BE M LDLY IRRITATING TO THE NOSE AND THROAT. SEE HEALTH DATA SECTION BELOW

INGESTION

DO NOT INGEST. THIS PRODUCT HAS NOT BEEN TESTED FOR HAZARDS RESULTING FROM INGESTION. INGESTION IS EXPECTED TO BE RELATIVELY NON TOXIC UNLESS ASPIRATION OCCURS. THIS PRODUCT HAS LAXATIVE PROPERTIES AND MAY RESULT IN ABDOMINAL CRAMPS AND DIARRHEA. SEE HEALTH DATA SECTION BELOW

HEALTH DATA

ON RARE OCCASIONS, PROLONGED AND REPEATED EXPOSURE TO OIL MIST POSES A RISK OF PULMONARY DISEASE SUCH AS CHRONIC LUNG INFLAMMATION. THIS CONDITION IS USUALLY ASYMPTOMATIC AS A RESULT OF REPEATED SMALL ASPIRATIONS. SHORTNESS OF BREATH AND COUGH ARE THE MOST COMMON SYMPTOMS. ASPIRATION MAY LEAD TO CHEMICAL PNEUMONITIS WHICH IS CHARACTERIZED BY PULMONARY EDEMA AND HEMORRHAGE AND MAY BE FATAL. SIGNS OF LUNG INVOLVEMENT INCLUDE INCREASED RESPIRATION RATE, INCREASED HEART RATE, AND A BLUISH DISCOLORATION OF THE SKIN. COUGHING, CHOKING, AND GAGGING ARE OFTEN NOTED AT THE TIME OF ASPIRATION. GASTROINTESTINAL DISCOMFORT MAY DEVELOP, FOLLOWED BY VOMITTING, WITH A FURTHER RISK OF ASPIRATION. THIS PRODUCT HAS NOT BEEN EVALUATED AS A WHOLE FOR TOXICOLOGICAL PROPERTIES. IT IS FORMULATED WITH MORE THAN 1/ OF A SIMILAR CHEMICAL COMPOSITION COMPONENT DEMONSTRATED TO BE A LABORATORY ANIMAL PRIMARY SKIN IRRITANT. PRIMARY SKIN IRRITATION IS NOT EXPECTED UPON DIRECT CONTACT BECAUSE OF THE LOW CONCENTRATION OF THIS COMPONENT IN THE MIXTURE. IT ALSO CONTAINS MORE THAN 1/ OF A SIMILAR CHEMICAL COMPOSITION PRODUCT DEMONSTRATED TO INDUCE SYSTEMIC EFFECTS OF THE LUNGS, LIVER, LYMPH NODES, AND SPLEEN WHEN TESTED ON THE SKIN OF LABORATORY ANIMALS AT REPEATED AND PROLONGED HIGH DOSES. THIS SAME COMPONENT IS CONSIDERED A LOW HEALTH HAZARD UNLESS INHALED IN VERY HIGH CONCENTRATIONS OR ASPIRATED INTO THE LUNGS. ACUTE AND CHRONIC INHALATION OF HIGH CONCENTRATIONS OF THIS COMPONENT HAVE BEEN ASSOCIATED WITH ADVERSE EFFECTS RELATED TO THE NERVOUS SYSTEM, GASTROINTESTINAL TRACT, LUNGS, EYES, AND REPRODUCTIVE SYSTEM. NO SUCH EFFECTS ARE EXPECTED UPON EXPOSURE TO THIS PRODUCT BECAUSE OF THE LOW CONCENTRATION OF THIS COMPONENT PRESENT IN THE MIXTURE

IV EMERGENCY & FIRST AID PROCEDURES

EYE CONTACT	IMMEDIATELY FLUSH EYES WITH LARGE AMOUNTS OF WATER AND CONTINUE FLUSHING FOR 15 MINUTES UNTIL IRRITATION SUBSIDES IF IRRITATION PERSISTS SEEK MEDICAL ATTENTION
SKIN CONTACT	REMOVE CONTAMINATED CLOTHING WASH CONTAMINATED AREA THOROUGHLY WITH SOAP AND WATER IF REDNESS OR IRRITATION OCCURS SEEK MEDICAL ATTENTION
INHALATION	IF EXPOSURE LEVELS EXCEED THE LIMITS LISTED IN SECTION II OR III REMOVE VICTIM FROM EXPOSURE IF BREATHING HAS STOPPED OR IS IRREGULAR ADMINISTER ARTIFICIA RESPIRATION AND SUPPLY OXYGEN IF IT IS AVAILABLE IF VICTIM IS UNCONSCIOUS REMOVE TO FRESH AIR AND SEEK MEDICAL ATTENTION
INGESTION	DO NOT INDUCE VOMITING SEEK IMMEDIATE MEDICAL ATTENTION

V PERSONAL HEALTH PROTECTION INFORMATION

EYE PROTECTION	EYE PROTECTION IS NOT REQUIRED UNDER CONDITIONS OF NORMAL USE IF MATERIAL IS HANDLED SUCH THAT IT COULD BE SPLASHED INTO EYES WEAR PLASTIC FACE SHIELD OR SPLASH PROOF SAFETY GOGGLES
SKIN PROTECTION	NO SKIN PROTECTION IS REQUIRED FOR SINGLE SHORT DURATION EXPOSURES FOR PROLONGED OR REPEATED EXPOSURES USE IMPERVIOUS SYNTHETIC RUBBER CLOTHING (BOOTS GLOVES APRONS ETC) OVER PARTS OF THE BODY SUBJECT TO EXPOSURE
RESPIRATORY PROTECTION	IF CONCENTRATIONS ARE LESS THAN 10 TIMES THE LIMITS IN SECTION II OR III USE AN ORGANIC VAPOR RESPIRATOR IF CONCENTRATIONS ARE GREATER THAN 10 TIMES THE LIMITS IN SECTION II OR III USE A SUPPLIED AIR RESPIRATOR OR A SELF CONTAINED BREATHING APPARATUS ALL RESPIRATORS MUST BE NIOSH CERTIFIED DO NOT USE COMPRESSED OXYGEN IN HYDROCARBON ATMOSPHERES
VENTILATION	ADEQUATE VENTILATION IN ACCORDANCE WITH GOOD ENGINEERING PRACTICE MUST BE PROVIDED TO MAINTAIN CONCENTRATIONS BELOW THE SPECIFIED EXPOSURE OR FLAMMABLE LIMITS SEE ALSO FIRE PROTECTION INFORMATION IN SECTION VI
OTHER	CONSUMPTION OF FOOD AND BEVERAGE SHOULD BE AVOIDED IN WORK AREAS WHERE HYDROCARBONS ARE PRESENT ALWAYS WASH HANDS AND FACE WITH SOAP AND WATER BEFORE EATING DRINKING OR SMOKING

VI FIRE PROTECTION INFORMATION

FLASH POINT	235F	TEST METHOD	P M C C
AUTOIGNITION TEMPERATURE	> 800F	TEST METHOD	NO DATA
FLAMMABLE LIMITS IN AIR % BY VOL	LOWER 1 0	UPPER	10 0

EXTINGUISHING MEDIA	USE DRY CHEMICAL FOAM OR CARBON DIOXIDE
SPECIAL FIRE FIGHTING PROCEDURES	WATER MAY BE INEFFECTIVE BUT CAN BE USED TO COOL CONTAINERS EXPOSED TO HEAT OR FLAME
UNUSUAL FIRE AND EXPLOSIVE CONDITIONS	DENSE SMOKE MAY BE GENERATED WHILE BURNING CARBON MONOXIDE CARBON DIOX DE AND OTHER OXIDES MAY BE GENERATED AS PRODUCTS OF COMBUSTION

VII REACTIVITY DATA

STABILITY (THERMAL LIGHT ETC)	STABLE	CONDITIONS TO AVOID	NONE
HAZARDOUS POLYMERIZATION	WILL NOT OCCUR	CONDITIONS TO AVOID	NONE

INCOMPATIBILITY MATERIALS TO AVOID	MAY REACT WITH STRONG OXIDIZING AGENTS
HAZARDOUS DECOMPOSITION PRODUCTS	NONE

VII ENVIRONMENTAL PRECAUTIONS

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	CONSULT HEALTH EFFECT INFORMATION IN SECTION III PERSONAL HEALTH PROTECTION INFORMATION IN SECTION V FIRE PROTECTION INFORMATION IN SECTION VI AND REACTIVITY DATA IN SECTION VII NOTIFY APPROPRIATE AUTHORITIES OF SPILL CONTAIN SPILL IMMEDIATELY DO NOT ALLOW SPILL TO ENTER SEWERS OR WATERCOURSES REMOVE ALL SOURCES OF IGNITION PROVIDE ADEQUATE VENTILATION DURING CLEAN UP ABSORB WITH APPROPRIATE INERT MATERIAL SUCH AS SAND CLAY ETC LARGE SPILLS MAY BE PICKED UP USING VACUUM PUMPS SHOVELS BUCKETS OR OTHER MEANS AND PLACED IN DRUMS OR OTHER SUITABLE CONTAINERS
WASTE DISPOSAL METHOD	ALL DISPOSALS MUST COMPLY WITH FEDERAL STATE AND LOCAL REGULATIONS THE MATERIAL IF SPILLED OR DISCARDED MAY BE A RCRA WASTE THE MATERIAL IF SPILLED OR DISCARDED MAY BE A REGULATED WASTE REFER TO STATE AND LOCAL REGULATIONS CAUTION IF REGULATED SOLVENTS ARE USED TO CLEAN UP SPILLED MATERIAL THE RESULTING WASTE MIXTURE MAY BE REGULATED DEPARTMENT OF TRANSPORTATION (DOT) REGULATIONS MAY APPLY FOR TRANSPORTING THIS MATERIAL WHEN SPILLED WASTE MATERIAL MAY BE LANDFILLED OR INCINERATED AT AN APPROVED FACILITY MATERIALS SHOULD BE RECYCLED IF POSSIBLE

IX MISCELLANEOUS

HANDLING AND STORAGE REQUIREMENTS	DO NOT TRANSFER TO UNMARKED CONTAINERS STORE IN A COOL WELL VENTILATED AREA IN CLOSED CONTAINERS AWAY FROM HEAT SPARKS OPEN FLAME OR OXIDIZING MATERIALS THIS PRODUCT IS CLASSIFIED AS COMBUSTIBLE UNDER DOT REGULATIONS SEE 49 CFR 171 THROUGH 178 FOR SHIPPING REQUIREMENTS FIRE EXTINGUISHERS SHOULD BE KEPT READILY AVAILABLE SEE NFPA 30 AND OSHA 1910 106 FLAMMABLE AND COMBUSTIBLE LIQUIDS
ADDITIONAL INFORMATION	THIS MIXTURE MAY BE FORMULATED IN PART WITH COMPONENTS PURCHASED FROM OTHER COMPANIES IN MANY INSTANCES ESPECIALLY WHEN PROPRIETARY OR TRADE SECRET MATERIALS ARE USED PENNZOIL COMPANY MUST RELY UPON THE HAZARD EVALUATION OF SUCH COMPONENT SUBMITTED TO PENNZOIL BY THAT PRODUCT S MANUFACTURER OR IMPORTER

X PHYSICAL PROPERTIES

BOILING POINT	IBP 300F	PERCENT VOLATILE	N/A
MELTING POINT	30F	VAPOR DENSITY (AIR=1)	4 5
APPEARANCE	GREEN BLUE COLOR	EVAPORATION RATE (EE=1)	N/A
ODOR	LUBE OIL ODOR	SPECIFIC GRAVITY	0 875
VAPOR PRESSURE	10 MM HG @ 100F	MOLECULAR WEIGHT	VARIES
SOLUBILITY	SOLUBLE IN HYDROCARBONS		

APPENDIX B

HOT WORK PERMIT PROCEDURE

	NUMBER 20
SUBJECT HOT WORK	PAGE 1 of 6
	DATE FIRST PUBLISHED 5/89

1. POLICY

No work involving a flame or spark producing operations is to be conducted without preparing a hot work permit and following the provisions of this procedure

2 PURPOSE

This procedure establishes requirements for cutting or burning operations

3 REQUIREMENTS

3 1 The site safety officer is to issue the hot work permit for any flame- or spark-producing operation This procedure is to be conducted daily whenever such operations occur

3 2 This procedure is to be read and complied with by any employee conducting hot work

3 3 The OHM site supervisor or site safety officer will complete the following procedures prior to beginning hot work

3 3 1 Conduct a visual inspection of area Remove any combustible material surrounding the work area Special attention will be paid to areas where hot slag can fall or spatter Any combustible material which cannot be readily removed will be covered or otherwise protected from the hot materials For example, covering a combustible surface with one inch of soil or wetting it may be sufficient

3 3 2 Designate a fire watch This person's (or persons') sole responsibility will be to monitor the welding or burning operation and have immediate access to a fire extinguisher of sufficient size and type for the potential combust-

ible material In addition, this person(s) shall be trained in the proper use of the appropriate fire extinguisher and be knowledgeable of the emergency signal and evacuation procedures as well as emergency shutdown procedures

3 3.3 Do not begin until all spaces, pipes, and sumps have been opened and tested for the presence of flammables If any flammable or combustible vapors exceed 10 percent lower explosive limits (LEL), no work will begin until levels are reduced As a rule, no hot work will begin when any combustible vapor is present

3 3 4 Personnel working in the area of the hot work will be alerted to the fact that hot work is taking place

3 3 5 A hot-work permit will be completed and posted

4. BURNING OPERATION SAFETY RULES

4.1 Wear adequate flame and heat resistant apparel and appropriate eye protection This includes chipping operations

4.2 Ensure that the area below is roped off and posted if work is overhead

4.3 Protect personnel and equipment in near vicinity against exposure from arc or sparks

4.4 Observe good housekeeping practices, keep excess hoses, cables, and equipment out of aisle ways, stairways, and your work station

4 5 Never use oil, grease, or pipe fitting compounds to make up connections on oxy-acetylene welding equipment

4 6 Store fittings in a manner to prevent contamination

4.7 Do not interchange oxygen and acetylene hoses, oxygen is coded green and acetylene is coded red

4 8 Do not force connections or strike or force valve wheels

4 8 1 Before connecting cylinders, read the label to ensure that the proper gas is being used

4 8 2 Cylinders must not be placed where they might form part of an electrical circuit Keep cylinders away from grating, layout tables and piping systems that may be used for ground of electrical welding circuits

4 9 Open oxygen valves momentarily to remove dust or dirt, stand on one side of the valve and avoid contact of gas with any combustible material

4 9 1 Pressure-adjusting screws on regulators will be fully released before the regulator is attached to a cylinder and the cylinder valve opened Open the cylinder valves slowly, stand to one side, not in front of pressure regulator gauge faces when opening cylinder valves

4 9 2 Do not use adjustable wrenches on acetylene cylinders, use the T-wrench provided Keep it in place at the cylinder

4 9 3 Never open an acetylene cylinder valve more than one and one half turns

4 10 Do not store tools or equipment in the recessed top of an acetylene cylinder, and do not allow water to accumulate there

4 11 Inspect the welding hose for defects before each use Keep hoses clear of equipment and hot slag

4 12 Do not use oxygen for cleaning, pressurization, or for ventilation

4 13 Do not relight flame on hot work when in an enclosed space Allow time for gases to escape and then use friction lighter

4 14 A metal part which is suspiciously light probably has a void inside and an opening should be drilled before heating Electrical boxes at the end of conduit should be opened prior to cutting conduit Valves on both ends of piping should be opened

4 15 Never lay work that is to be heated or welded on a concrete floor because when sufficiently heated, concrete may spall and fly with danger of injury

4 16 Do not cut material in such a position that severed parts will fall striking legs or feet of the operator or assistant, or damaged gas lines

4 17 When a flashback occurs, both gases should be shut off -- first oxygen, then acetylene Before lighting the torch again, see that it is cool and that no damage has been done to the torch, hose, or regulator

4 18 Mark work "HOT" if left unattended or where others may come in contact with hot surfaces

4 19 When burning operations are to be stopped for a few minutes during the course of the work, it is permitted to close torch valves only When work is stopped for a longer period or is left unattended, the following steps must be taken

- o Close oxygen and acetylene cylinder valves
- o Open torch valves to relieve pressure, then close again
- o Release regulator pressure adjusting screws

4 20 Before regulator is removed from a cylinder, the cylinder valve will be closed and the gas released from the regulator

5 PERSONAL PROTECTIVE EQUIPMENT

The normal personal protective equipment worn when working with hazardous materials generally provides inadequate protection from flames or heat The person performing the work shall supplement the existing equipment with the following

- o Welding gloves fashioned from leather or other fire-resistant material
- o Apron or jacket fashioned from leather or other fire-resistant material
- o Chapps, if necessary, for leg protection
- o Eye protection and face protection with appropriate ANSI darkened lenses
- o If necessary, flash-fire protection Note normal chemical protective clothing is inappropriate for fire situations

6 HOT WORK PERMIT

6 1 No employee of OHM is to begin hot work unless a hot work permit has been obtained It is the responsibility of the project supervisor to request this permit The hot-work permit shall be signed by the supervisor and site safety officer and explained to each affected employee

6 1 1 It is the responsibility of the project supervisor to see that workers comply with all safety practices of the hot work permit

6.2 The hot work permit will be valid for a single work shift only On projects requiring more than a single work shift, a new permit shall be completed at the start of each shift The permit shall be displayed at the project site

6.3 At the conclusion of the project, the hot work permits will be forwarded to the site project control technician and placed in the project file

OHM

HOT WORK PERMIT

Date _____ Time _____

Location _____

Isssued to _____

Site Safety Officer _____

Supervisor _____

Do not cut or use other open flame or spark producing equipment until the following precautions have been taken

Protective Equipment used _____

_____

(Initial Each Item)

_____ The location where the work is to be done has been personally examined

_____ Any available fire protection systems are in service

_____ There are no flammable dusts vapors liquids or unpurged tanks (empty) in the area

_____ Explosimeter reading <10% LEL

_____ All combustibles have been moved away from the operation or otherwise protected with fire curtains or equivalent

_____ Ample portable fire extinguishing equipment has been provided

_____ Arrangements have been made to patrol the area for at least 1/2 hour after the work has been completed

_____ The phone number for the local Fire Department is _____

This form must be filled out daily whenever HOT WORK is being conducted and posted at the jobsite

APPENDIX C

HEAT STRESS/COLD STRESS

SUBJECT	NUMBER
HEAT STRESS	17
	PAGE 1 of 4
	DATE FIRST PUBLISHED 5/89

1 POLICY

Project supervision is to be aware of the symptoms and causes of heat-related illnesses and take appropriate steps to prevent their occurrence

2 PURPOSE

This procedure describes the causes, symptoms, treatment, and/or prevention of heat-related illness

3 GENERAL INFORMATION

3 1 Heat-related illnesses are generally caused by the body's inability to remove metabolic heat while being exposed to excessive environmental heat

3 2 A period of adjustment or acclimatization is necessary before maximum tolerance to heat is acquired Most workers require 7 to 10 working days of gradually increasing workload to become fully acclimatized

3 3 The body's core temperature must be maintained below 100 degrees Fahrenheit or else heat stress can occur

3 4 Pulse rate is another good indicator of heat stress The pulse rate after one minute of recover should be less than 110

3 5 Heat-related illnesses are caused by the loss of water and electrolytes

4 HEAT-RELATED ILLNESSES

4 1 Heat rash can be caused by continuous exposure to hot and humid air

Signs and Symptoms The condition is characterized by a localized red skin rash and reduced sweating Aside from being a nuisance, the ability to tolerate heat is reduced

Treatment Keep skin hygienically clean and allow it to dry thoroughly after using chemical protective clothing

4 2 Heat cramps are caused by profuse perspiration with inadequate fluid intake and salt replacement

Signs and Symptoms Muscle spasm and pain in the extremities and abdomen

Treatment Remove affected person to a cool place and give sips of salted water (1 teaspoon of salt to 1 quart of water) The salted water should quickly mitigate the cramps Manual pressure may also be applied to the cramped muscles

4 3 Heat exhaustion is a mild form of shock caused by sustained physical activity in heat and profuse perspiration without adequate fluid and salt replacement

Signs and Symptoms Weak pulse, shallow breathing, pale, cool, moist (clammy) skin, profuse sweating, dizziness, fatigue

Treatment Remove affected person to a cool place and remove as much clothing as possible Give sips of salted water and fan the person continually to remove heat by convection CAUTION Do not allow the affected person to become chilled -- treat for shock if necessary

4 4 Heat stroke is the most severe form of heat stress, the body must be cooled immediately to prevent severe injury and/or death

Signs and Symptoms Red, hot, dry skin, body temperature of 105 degrees Fahrenheit or higher, no perspiration, nausea, dizziness and confusion, strong, rapid pulse, coma

Treatment Heat stroke is a true medical emergency Transportation of the victim to a medical facility must not be delayed Prior to transport, remove as much clothing as possible and wrap the victim in a sheet soaked with water Fan vigorously while transporting to help reduce body temperature Apply cold packs, if available, place under the arms, around the neck, or any other place where they can cool large surface blood vessels If convulsions develop, prevent victim from biting his tongue If transportation to a medical facility is delayed, reduce body temperature by immersing victim in an ice/water bath (however, be careful not to over chill the victim once body temperature is reduced below 102 degrees Fahrenheit) If this is not possible, keep victim wrapped in a sheet and continuously douse with water and fan

5 SPECIFIC REQUIREMENTS

5 1 A section of site-safety plans will address heat stress if the ambient temperature is expected to exceed 70 degrees Fahrenheit

5 2 The site-safety plan will discuss work-rest cycles and provisions for monitoring the level of heat stress (i e , pulse rate)

5 3 Workers are to be advised not to drink caffeinated or alcoholic beverages because they increase the rate of body water loss

5 4 Increased dietary salt or lightly salted (0 2 percent) water is adequate to replace lost salt Salt tablets are not to be used

5 5 If juice or electrolyte drinks are used, they should be diluted prior to drinking

5 6 Thirst is not an adequate indicator of body water loss Workers are to drink at least small amounts of water on each break

5 7 Workers are to rest when any of the symptoms described above are present The buddy system is mandatory, as most often the potential victim will not be aware of any symptoms Watch out for each other

COLD-STRESS GUIDELINES

Injuries such as frostbite and hypothermia and an impaired ability to work are dangers inherent to outside work during winter months in the North Since a major portion of this project will occur during the winter, precautionary measures against these dangers will be taken

Background

Internal body temperature is maintained by a complicated system of sweating, shivering, dilation, and constriction of the skin's blood vessels When the body is first challenged by cold, it conserves heat by curtailing blood supply to the skin If this heat conservation measure is not adequate, involuntary muscle response (shivering) is initiated to increase body heat If both measures fail to generate enough heat, a series of harmful effects can occur

Harmful Effects

The following information is quoted from Occupational Diseases 'A Guide to Their Recognition'

> "Frostbite occurs when there is actual freezing of the tissues with the attendant mechanical disruption of cell structure Theoretically, the freezing point of the skin is -1°C, however, with increasing wind velocity, heat loss is greater and frostbite will occur more rapidly Once started, freezing progresses rapidly For example, if the wind velocity reaches 20 mph, exposed flesh will freeze within about one minute at -10°C Furthermore if the skin comes in direct contact with objects whose surface temperature is below freezing point, frostbite may develop in spite of warm environmental temperatures The first warning of frostbite is often a sharp, pricking sensation However, cold itself produces numbness and anesthesia which may permit serious freezing to develop without the warning of acute discomfort Injury produced by frostbite may range from simple superficial injury with redness of the skin, transient anesthesia and superficial bullae to deep tissue freezing with persisting ischemia, thrombosis, deep cyanosis, and gangrene "
>
> "Trench foot or immersion foot may be caused by long, continuous exposure to cold without freezing, combined with persistent dampness or actual immersion in water This condition is due to persistent local tissue anoxia, combined with mild or severe cold with resultant injury to the capillary walls

Edema, tingling itching and severe pain occur and may be followed by blistering, superficial skin necrosis, and ulceration '

"General hypothermia is an extreme acute problem resulting from prolonged cold exposure and heat loss If an individual becomes fatigued during physical activity, he will be more prone to heat loss, and as exhaustion approaches, the vasoconstrictor mechanism is overpowered, then sudden vasodilatation occurs with resultant rapid loss of heat, and critical cooling ensues Sedative drugs and alcohol increase the danger of hypothermia "[1]

Control Measures

To guard against cold injury, the following measures will be taken

- Workers will be outfitted with winter clothing
- Clothing will be changed as soon as it becomes wet
- Warm shelters and regular rest periods will be available for crew members
- Training session will be regularly held to emphasize warning symptoms such as reduced coordination, drowsiness, impaired judgment, fatigue, and numbing of toes and fingers
- Warm beverages will be provided

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1 Occupational Diseases A Guide to Their Recognition, revised edition, June 1977, DHHW Publication No 77-181

APPENDIX D

WORKER ACKNOWLEDGMENT TO HEALTH AND SAFETY PLAN

WORKER/VISITOR ACKNOWLEDGMENT TO HEALTH-AND-SAFETY PLAN

I HAVE READ THE SITE-SAFETY PLAN FOR THIS SITE AND FULLY UNDERSTAND ITS CONTENTS I AGREE TO FOLLOW THIS SITE SAFETY PLAN IN ALL RESPECT

NAME	DATE