

Seismic Reflection Survey: Health and Safety Plan

Kansas Geological Survey
Exploration Services Section

Savannah River National Laboratory
Surface Seismic Characterization,
'F' Area Seepage Basin, SRNL
August 2010

Open-file Report #2010-12

**KANSAS GEOLOGICAL SURVEY EXPLORATION SERVICES
ACCIDENT PREVENTION PLAN**

I. PROJECT DESCRIPTION

Project Name: Surface Seismic Characterization, 'F' Area Seepage Basin SRNL

Location: Savannah River National Laboratory, Georgia

Site Safety Officer: Richard D. Miller

Plan Prepared by: Richard D. Miller

Estimated Duration of Field Work: 5 days

II. STATEMENT OF WORK

Predictions of plume evolution, migration, and remediation efficacy at the plume scale often fail because of the great simplifications that are typically made in the representation of subsurface heterogeneity and coupled hydrobiogeochemical processes. In parallel with efforts led by the EM-supported Technical Working Group (TWG) focused on Attenuation-based remedies for metals and radionuclides and the LBNL Sustainable Systems Scientific Focus Area (SFA), the Kansas Geological Survey (KGS) proposes to investigate the feasibility (resolution potential, sensitivity, and consistency) of using surface seismic reflection data to characterize and the spatial distribution of key Atlantic Coastal Plain strata within saturated zone at 'F' area seepage basin of the Savannah River Site, Georgia.. Key to the seismic reflection program will be our ability to discriminate subtle changes in reflection continuity, characteristics, and attributes at very high horizontal and vertical fidelity and then correlate those changes to lithology, hydrology, and/or material properties measured at or between wellbores. The proposed effort complements the LBNL SFA effort to explore a 'reactive facies' approach for integrating mechanisms and rates obtained at the laboratory scale with hydrogeological information obtained at the field scale as needed to make reliable and computationally tractable predictions of plume evolution. The reactive facies approach seeks to identify units that have unique distributions of hydraulic, sediment geochemistry, and surface complexation properties, which are all important for assessing reactive transport. The SFA challenge also includes a formal evaluation of the benefit of increasing complexity on successful predictions of contaminant mobility over stewardship timeframes. The proposed effort complements the LBNL and TWG efforts to explore tools that will allow incorporation of natural attenuation processes into long-term stewardship decisions, and of developing available basic science advances relevant to natural attenuation remedies to make them more useful to managers making remediation decisions. The proposed effort is expected to greatly contribute to the TWG and SFA efforts by providing a vehicle for extrapolating insights about plume evolution and attenuation capacity that are developed locally to the plume scale, where remediation decisions are made.

Of key interest are material characteristics within the saturated interval. Lithologic interpretations of the surface seismic data could directly or indirectly be related to hydrofacies, which, if interpretable, would provide an important extension of the highly detailed and high-resolution images and characterization made in the individual boreholes (Figure 1). Important information will be obtained about the lateral continuity of the various beds and about several seismic attributes that might be sensitive to changes in material properties (i.e., stiffness, density, etc).

Geologic and hydrologic target intervals at this site are Middle and Upper Eocene sands, clays, and silts. Two key hydrostratigraphic units/zones that will likely represent site-wide seismic markers are Confining Zone IIB and Confining Unit IIA-IIB. These aquatards are clearly interpretable on gamma logs and appear to be present in cuttings from boreholes across the site that TD at least 100 ft above MSL. The upper confining layer (Confining Zone IIB) is at an average depth of around 180 ft above MSL and the lower confining layer (Confining Unit IIA-IIB) is at an average depth of around 120 ft above MSL. With the water table at an average depth of 200 ft above MSL, the vadose zone will average from zero at Fourmile Branch to more than 60 ft near the northwest corner of the study area. Indiscriminate sands and silty/clayey sands dominant the sections and should provide moderate acoustic impedance contrasts for the CMP seismic reflection method.

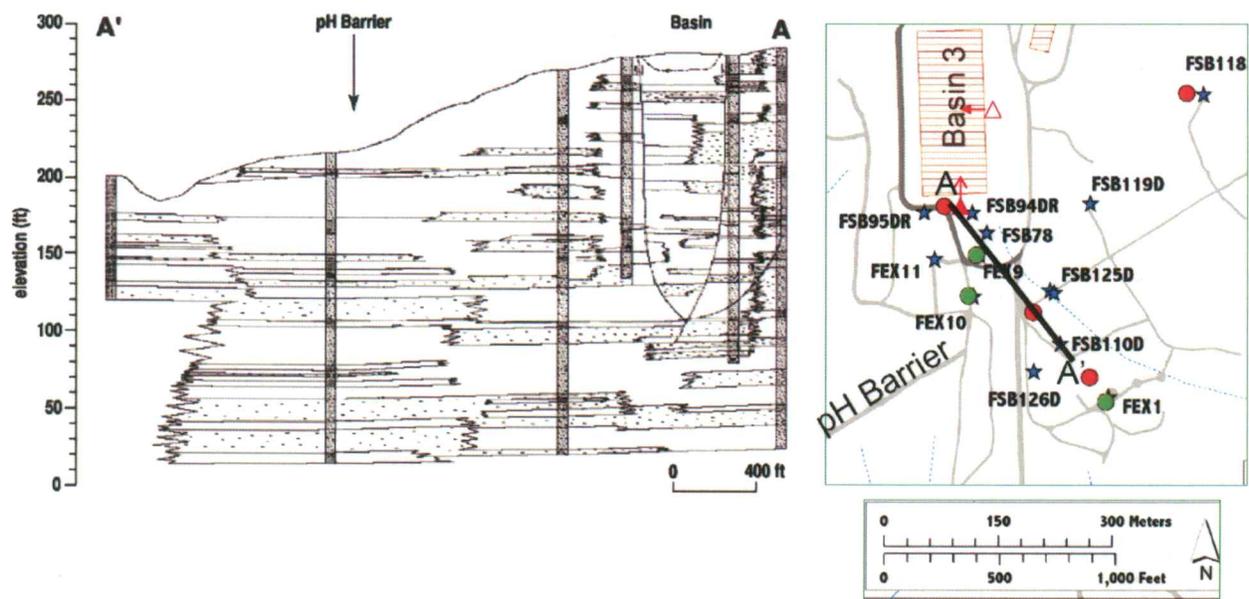


Figure 1. Left: Geologic cross section of target area for seismic reflection survey. Right: Study area and location of A-A' Cross section. The surface seismic will be used to connect characterization performed by the EM technical working group and the LBNL SFA at 'local-scale' study sites, located south of Basin 3 and near wells outside of the main plume (such as near well FSB118). Figures from Denham et al., SRNL.

This applied research program will involve the acquisition and processing of 2-D Common Midpoint (CMP) style seismic reflection data, collected principally along a transect consistent with the orientation of A-A' (Figure 1) with at least one cross line (depending on data characteristics and available time). We propose to work closely with the TWG and SFA teams to

choose the locations of the surface seismic transects, so that the transects connect their detailed characterization (hydrogeochemical-geophysical) and push-pull tests that will be performed at two 'local-scale' study sites (one located within the plume and one located outside of the plume). Acquisition will include at least two crossing 2-D lines, with complementary downhole velocity surveys, and walkaway tests. Processing of these data will focus on correlation with existing data from other geophysical methods and borehole characterizations from hydrologic and geologic sampling. Interpretation will principally focus on correlation of the seismic wavelet characteristics with observed and inferred properties within the saturated intervals. These data will be fully appraised for their accuracy and consistency with other data sets. Merging of these data with all other applicable data acquired at this site should produce a map of the material properties at a resolution sufficient for monitoring remediation processes proposed for this site.

The obtained spatial distribution of geophysical attributes (such as horizon depths, velocity, and attenuation) obtained from the surface seismic dataset will be used within a stochastic framework developed by the SFA and TWG teams to integrate hydrogeochemical properties and rates spatially, as needed to assess the natural attenuation capacity at the plume scale and to provide input for reactive transport modeling. The surface seismic datasets are expected to be extremely valuable for helping to interpolate information about mechanisms and properties, obtained at the core to 'local' field scale, to the plume scale. Although surface seismic approaches are expected to be ideal for such characterization, they are commonly used only for providing an image of the subsurface seismic reflectivity, which is often conceptualized as a pseudo cross section of the subsurface. Through the SFA and TWG efforts, the information obtained from the surface reflection data will be integrated with other datasets and will be used for quantifying the reactive facies at the plume scale. To our knowledge, this is a novel use of a developed characterization approach that promises to greatly improve our understanding of the attenuation capacity of the F-Area. The expected advances in integrating multi-scale disparate types of datasets for delineating controls on plume fate and transport are expected to be not only useful at the F-Area, but to many other sites in the complex and private sector.

ACQUISITION

Acquisition geometry and parameters have been formulated based on a target depth of interest between the ground surface and a depth of 170 ft on one end of the profile and ground surface to around 100 ft on the opposite end. Bed resolution of around 5 to 10 feet will be necessary to effectively differentiate bedding as interpreted from well/boring data. Within the vadose zone an average velocity of around 3000 ft/sec is assumed and within the saturated interval a velocity of 5000 ft/sec was selected for planning purposes. Using these velocity values and the 'half wavelength' criteria for vertical bed resolution we need to introduce signals having frequencies of approximately 150 Hz to 300 Hz within the vadose zone and 250 Hz to 500 Hz within the saturated interval to resolve top and bottom of these individual thin beds. If the signal to noise ratio is excellent, then it might be possible to extend the resolution criteria to a quarter wavelength criteria, thereby reducing the required dominant frequency range to around 100 Hz to 250 Hz.

Considering the near-surface conditions, target depths, and resolution requirements a 240 channel, 24 bit seismograph will record data from a receiver spread approximately 960 ft in length with receivers spaced at around 4 ft and shot stations on 8 ft intervals. The acquisition

approach will employ working the source through the inside 120 receiver channels while the recording spread is fixed (Figure 2). This approach will result in a variable fold data set with a maximum source to receiver-offset range from around 240 ft and to 720 ft and a minimum offset as small as 2 ft. Each receiver station will be instrumented with two Mark Products L28E 40 Hz geophones. The source will be selected based on walkaway tests, but the 50-caliber downhole, 30.06 downhole, and 8- and 12-gauge auger gun sources will be tested.

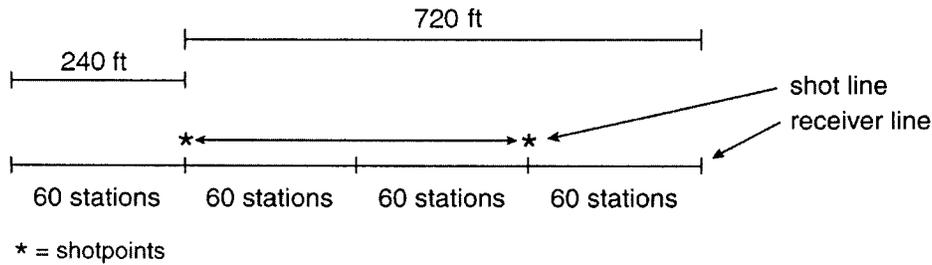


Figure 2. Spread geometry for fixed component of rolling spread.

A total of around 4000 ft of profile will be collected along transects that optimally test the approach and enhance the understanding of the site. To acquire this much data it is imperative that the profile lines are located where no surface obstructions exist and no surface or subsurface obstacles exist that will interrupt the drilling of 3 ft deep holes for source placement.

Surface-to-borehole data will be acquired at one or both of the ‘local scale sites’ to correlate reflections observed in time with reflector mapped as a function of depth. Acquisition, processing, and interpretation of vertical seismic profiles (VSP) will follow well-established guidelines. As with most seismic methods, adapting methodologies developed in the oil industry to shallow targets requires deviating from accepted “rules of thumb.” A walkaway VSP will be acquired with the source moving away from the borehole near the proposed reflection lines. Near-vertical offset VSP (ZVSP) will provide the best measure of velocity as a function of depth and will likely have a source offset of less than 10 ft. Offset VSP (OVSP) profiles will assist with lithologic and structural interpretation of reflection profiles as well as provide valuable, yet somehow limited velocity and reflector information a relatively short distance from the borehole. VSP sections will be processed and interpreted so any reflectors intersecting the borehole can be mapped away from the borehole to a maximum offset of about one-quarter the imaged depth in the boreholes (i.e., image depth less than 200 ft). The borehole sampling interval will be in the 5 to 10 ft range depending on reflection wavelet frequency characteristics.

PROCESSING

Interpretation of high-resolution shallow reflection data must take into consideration not only the geologic information available but also each step of the processing flow and the presence of reflection events on raw unprocessed data. Processing for the reflection portion of this study will include only operations or processes that enhance signal-to-noise-ratio and/or resolution as determined by evaluation of high-confidence reflections interpreted directly on shot gathers (Table 1). For the most part, processing of high-resolution shallow reflection data is a matter of scaling down conventional processing techniques and methods; however, without extreme

attention to details, conventional processing approaches will produce undesirable artifacts. In-field processing of the reflection data will include inspection of shot gathers to insure the data acquired are of sufficient quality to provide meaningful interpretations and to permit the extraction of meaningful wavelet attributes during detailed processing planned to be completed several months after leaving the field. In-field processing will be coincident with data acquisition and will not impact the full-day field schedules.

Table 1
Basic Processing Flow

Primary Processing

format
preliminary editing
trace balancing
digital filtering
spectral balance
first arrival muting (remove direct wave and refraction)
surgical muting (removal of ground roll based on trace-by-trace arrival)
assign geometries (input source and receiver locations)
elevation correction to multiple, floating datums
sort into CMPs (re-order traces in common midpoints)
velocity analysis (whole dataset analysis on 100 ft/sec increments)
spectral analysis (frequency vs amplitude plots)
NMO correction
surface consistent correlation statics
secondary editing
residual correlation statics
CMP stack
amplitude normalization
correct to flat datum
display

Secondary Processing

f-k filtering
f-k migration
deconvolution (spiking and second zero crossing)
f-x deconvolution

INTERPRETATION

Geologic control will be used to insure geophysical interpretations are correctly correlated to lithology and associated hydrologic units. Accurate geologic interpretations from seismic reflection sections should incorporate borehole measurements and lithologic descriptions correlating time-to-depth with NMO and downhole velocities. A walkaway VSP combined with the extensive borehole information at this site will enhance the correlation of reflections interpreted on seismic data with reflectors mapped in the borehole. Walkaway VSPs should provide correlation between the sequences of thin beds observed in boring data with seismic waveforms representing those bedding plains.

Seismic attributes extracted from reflection waveforms will relate to unique geologic characteristics of earth materials. Correlating the seismic attributes defined specific at well locations with borehole measurements of physical properties may provide marked improvement

in the accuracy of earth models used to define bed continuity and changes in key hydrologic properties. Based on the quality and accuracy of the calculated attributes, canonical analysis will be attempted to estimate optimal relationships between empirical sets of attributes and earth properties measured in boreholes. The resulting equations will then be used to evaluate the property sets where no direct observations are available. Overall interpretation of the surface seismic datasets in terms of reactive facies will be performed as part of the SFA and TWG effort, which will integrate the surface seismic attributes, other hydrogeochemical wellbore and geophysical tomographic datasets collected by the TWG and SFA within a multi-scale Bayesian framework.

RESEARCH PRODUCTS

From this applied research project will come several products, which will be provided to LBNL. These include:

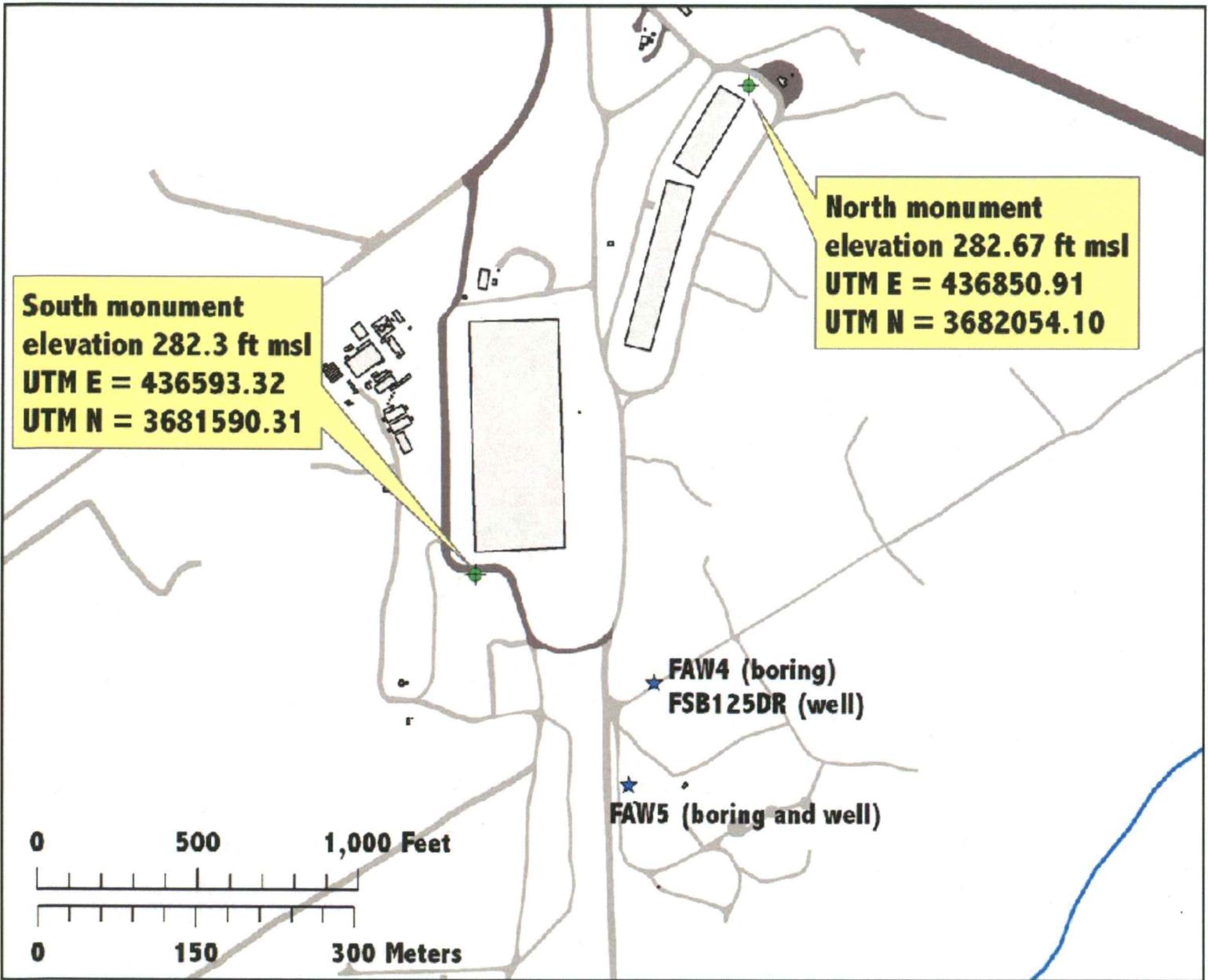
- 1) complete set of digital data with field notes;
- 2) preliminary stacked sections with associated interpretation in advance of the draft report;
- 3) acquisition report, which includes spread configurations and representative raw and filtered shot gathers as well as digital field photographs;
- 4) processing report, which includes a series of shot gathers and stacked section at intermediate stages of processing;
- 5) interpretation report, which includes correlations between borehole and CMP stacked sections, attribute displays, and various display formats;
- 6) draft report, which includes sections on acquisition, processing, and interpretation;
- 7) electronic file of attributes obtained from final processing, including key horizons, interval velocities and some measure of amplitude/attenuation as a function of position;
- 8) final report after review and comment; and
- 9) if data justifies, publication and presentation of significant findings.

These products will be provided to LBNL and the TWG on a deliverables schedule that is mutually agreeable to all.

BENCHMARKS

A map showing the locations and elevations of the benchmarks relative to FAW5 and FSB125DR, the two wells that are part of this research, is on page 7.

Location	SRS N	SRS E	Elevation (ft msl)	UTM E	UTM N
North benchmark	75730.17	51570.04	282.67	436850.91	3682054.10
South benchmark	74997.11	49990.82	282.3	436593.32	3681590.31



III. RESPONSIBILITIES

The responsibility for providing each employee a safe working environment rests with each employee's respective employer. This plan, therefore, applies only to KGS for the survey activities. Each employee of KGS will strive to identify and mitigate any safety hazards encountered. All parties will cooperate in working as safely as possible and will comply with all applicable safety requirements as set forth by SRNL as well as those included in this document.

In addition to the safety procedures indicated herein, we will adhere to the following:

1. In the event of electrical storms in the vicinity, all surface operations will cease if lightning strikes are closer than three miles (determined by 15 second count between lightning and thunder and/or by lightning detector).
2. If conditions become excessive (i.e., temperature $> 100^{\circ} < 30^{\circ}$ F), continuous day operations may be modified to minimize chances for heat- or cold-related medical problems. Breaks of up to one hour after every hour of work might be necessary in extreme situations (i.e., temperature $> 110^{\circ} < 0^{\circ}$ F). Maximum hydration of staff will be strived for at all times.
3. Appropriate field boots will be worn and due caution will be exercised with respect to snakes, ditches, swampy areas, and ground debris. Steel toes will be worn by all field crew members.
4. Safety glasses will be worn by crew members when operating open-air vehicles or sources. Safety glasses are recommended when planting geophones.
5. At least one gallon of fresh water will be on hand at the beginning of each day for each crew member. An ice chest for keeping foodstuff cold and an ice chest for medical use in case of injury or overheating will be available on-site.
6. In the case of excessive cold weather, a sheltered area will be available with inside temperatures above 32° F.
7. The seismic crew will operate with an established protocol for initiating seismic sources. The safety plan will be approved by the SRNL Representative prior to initiation of field operations.
8. Appropriate drivers licenses will be held by operators of vehicles at all times (KDOT regulations). All KGS staff will have appropriate utility vehicle (UTV) training. All vehicles will be operated in accordance with manufacturer's documented procedures.
9. All explosive or flammable materials will be properly stored in vehicles and labeled in accordance with KDOT regulations during transport. MSDSs will be in this safety plan for all regulated, controlled, or potentially hazardous materials.
10. High pressure systems will be identified and will be maintained to meet or exceed manufacturer's specifications.

11. Work along roads will comply with regulations as established by KDOT (in Kansas) or local department of transportation (for out-of-state).
12. Proper work gloves and clothing for site conditions will be worn by all KGS staff.

IV. FIRE PREVENTION AND PROTECTION PROGRAM

The overall objective of the KGS field fire prevention and protection program is to maintain a consistent awareness of fire potential in our various areas of responsibility. It is imperative to be ever vigilant in identifying ignition sources and potential spark-advancing fuels. These concerns span not only flammable materials brought on-site by the KGS, but also any combustible or explosive materials already on the site or naturally present within the study area.

Seismic operations involve the controlled release of large quantities of energy. Some sources of that energy require explosions that are an ignition source, while others generate sufficient heat in the presence of flammable liquids to potentially exceed the ignition point of many combustible materials. Therefore, when site conditions are conducive to sustaining combustion, extreme caution is required when operating seismic sources.

All gasoline engines have spark arrest exhausts to reduce the threat of igniting any combustible or flammable materials.

Smoking is only allowed in designated areas and all cigarette butts and ashes are disposed of in sand-filled cans provided in smoking areas. Under no circumstances are lit cigarettes discarded on the ground in work areas.

Several areas of specific concern and operational awareness are:

- a) handling and storage of flammable materials
No flammable solids will be transported or used during normal seismic surveying. Flammable liquids will be limited to petroleum products such as diesel, gasoline, lubricating oils, etc.
- b) containment of flammable liquids
Flammable liquids will be transported to the site in steel, U.S. Government approved nurse tanks, mounted in the bed of a truck, and labeled appropriately (and a single 5-gal. can to allow fill-up remote from nurse tanks). These flammable liquids include diesel and gasoline used for fuel in the seismic vibrator and support UTVs. Quantities transported in nurse tanks will not exceed 100 gallons of either type. Petroleum operated engines will have fuel supplied via manufacture provided and certified fuel tanks. Transfer pumps will be installed and maintained in accordance with manufacturer specifications.
- c) fire protection at storage locations
The nature of seismic work prohibits effective use of fixed storage locations. All mobile facilities (trailers) will have fire extinguishers at or near doors. Vehicles will have fire extinguishers located in accord with KDOT regulations.
- d) how fires shall be handled on project
All personnel will be educated on the fire triangle and matching extinguisher types with fires. All on-site KGS staff will have been instructed, prior to arrival on site, to the appropriate procedures for fire containment and extinguishing, making the removal of any one side of the fire triangle the principal objective.
- e) fire watch or hot work permits
No hot work will be undertaken on-site. Fire watch will be a supplemental task of every member of the seismic crew.

V. SAFETY PERSONNEL

Safety Personnel and Emergency Contacts

1. Rick Miller (KGS)—Site Safety Officer
2. Joe Anderson (KGS)—Operations
3. Miles Denham (SRNL)—Technical Representative
4. Margaret “Maggie” Millings (SRNL)—Site Representative

VI. EMERGENCY INFORMATION

SRS Emergency Contacts

Fire, Rescue, Security, Medical, Spill – SRSOC 803-725-1911

SRSOC = Savannah River Site Operations Center

Call the SRS Operations Center (SRSOC) and they can easily have the onsite fire, medical, security/police respond to whatever situation arises. You will need to tell them your location.

The field site is located in grid coordinates = N2, W3

Other landmarks – field site is near F-Area Seepage Basins off of Road C

SRNL Contacts

	Phone	Pager
Miles Denham	803-725-5521	13046
Maggie Millings	803-725-6230	17407
Jay Noonkester	803-725-3434	12973

*for pagers, dial 803-725-PAGE (7243) then enter pager number when prompted

ACP (Area Completion Projects) Contacts

ACP is the group who owns/runs the waste site where you will be working.

	Phone	Pager
Andy Preston, PIC (Person in Charge)	803-507-6222 (cell)	16385
John Wehr, Safety & Health Lead	803-952-6414	13386

*for pagers, dial 803-725-PAGE (7243) then enter pager number when prompted

KGS Emergency Contacts

Safety Coordinator and Project Manager

Rick Miller, Kansas Geological Survey, 785-864-2091

Cellular (in the field): 785-766-8638

KGS Safety Officer

Kathy Sheldon, Kansas Geological Survey

Office: 785-864-2109

Lodging

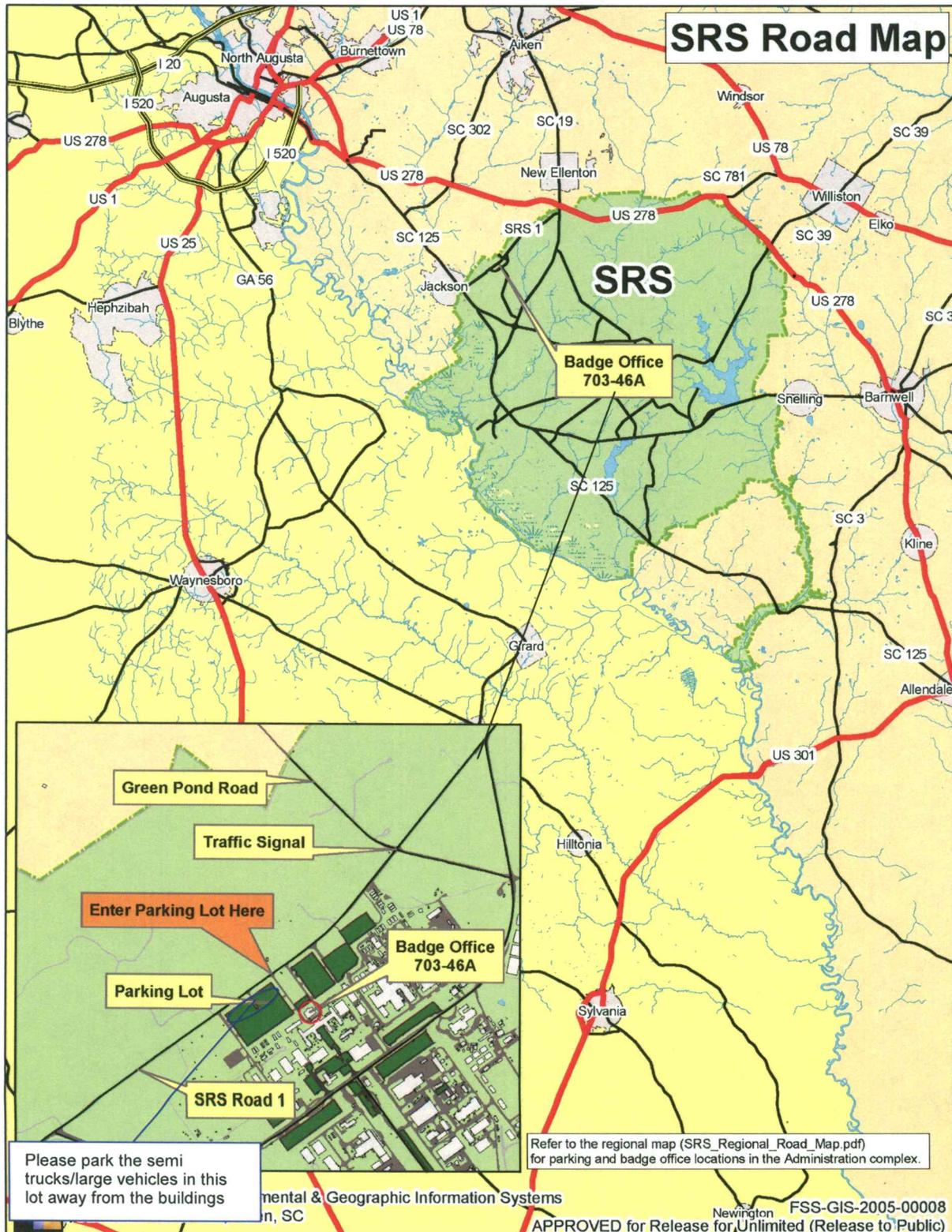
Country Inn and Suites

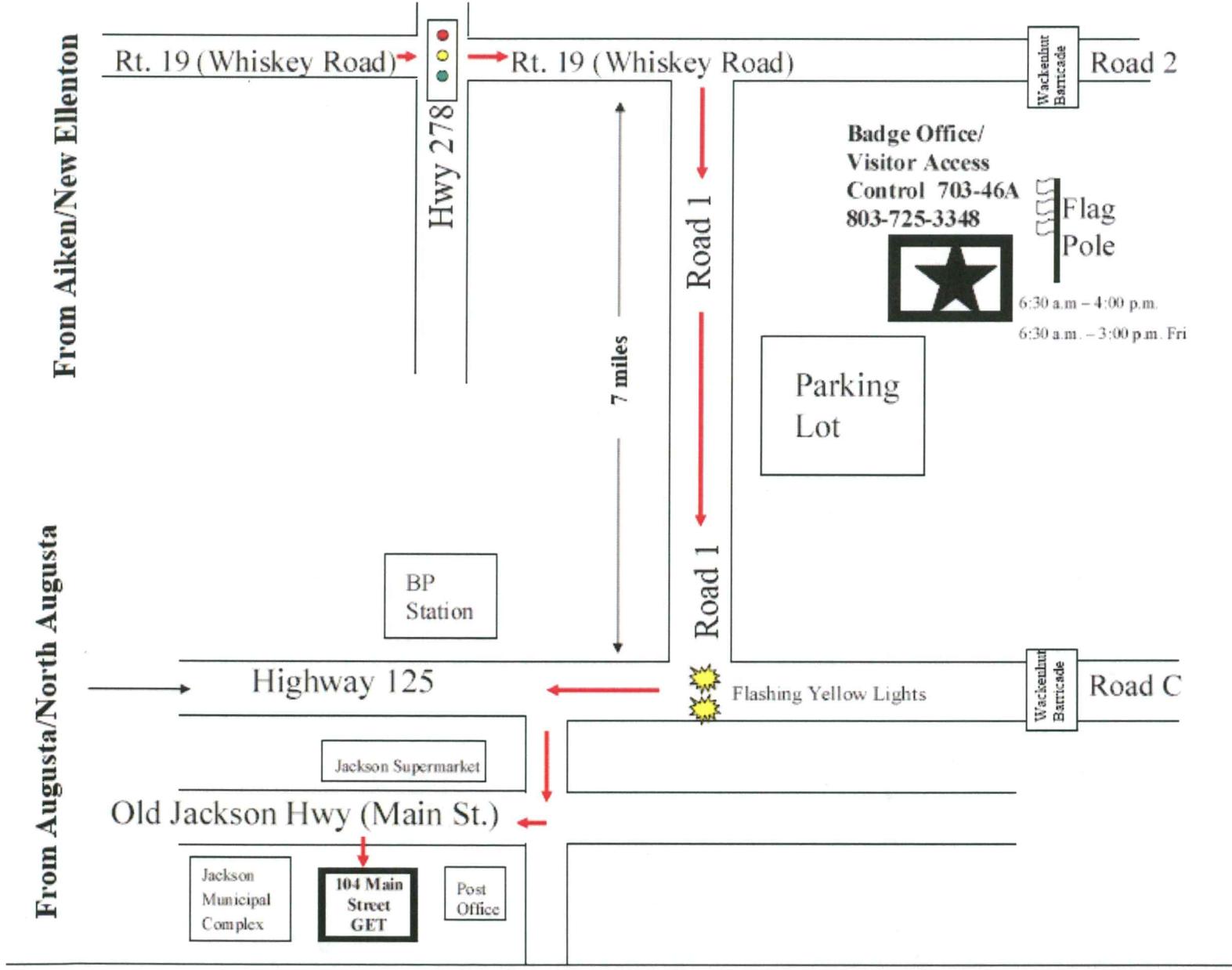
3270 Whiskey Road

Aiken, SC 29803

(803) 649-4024

General Maps



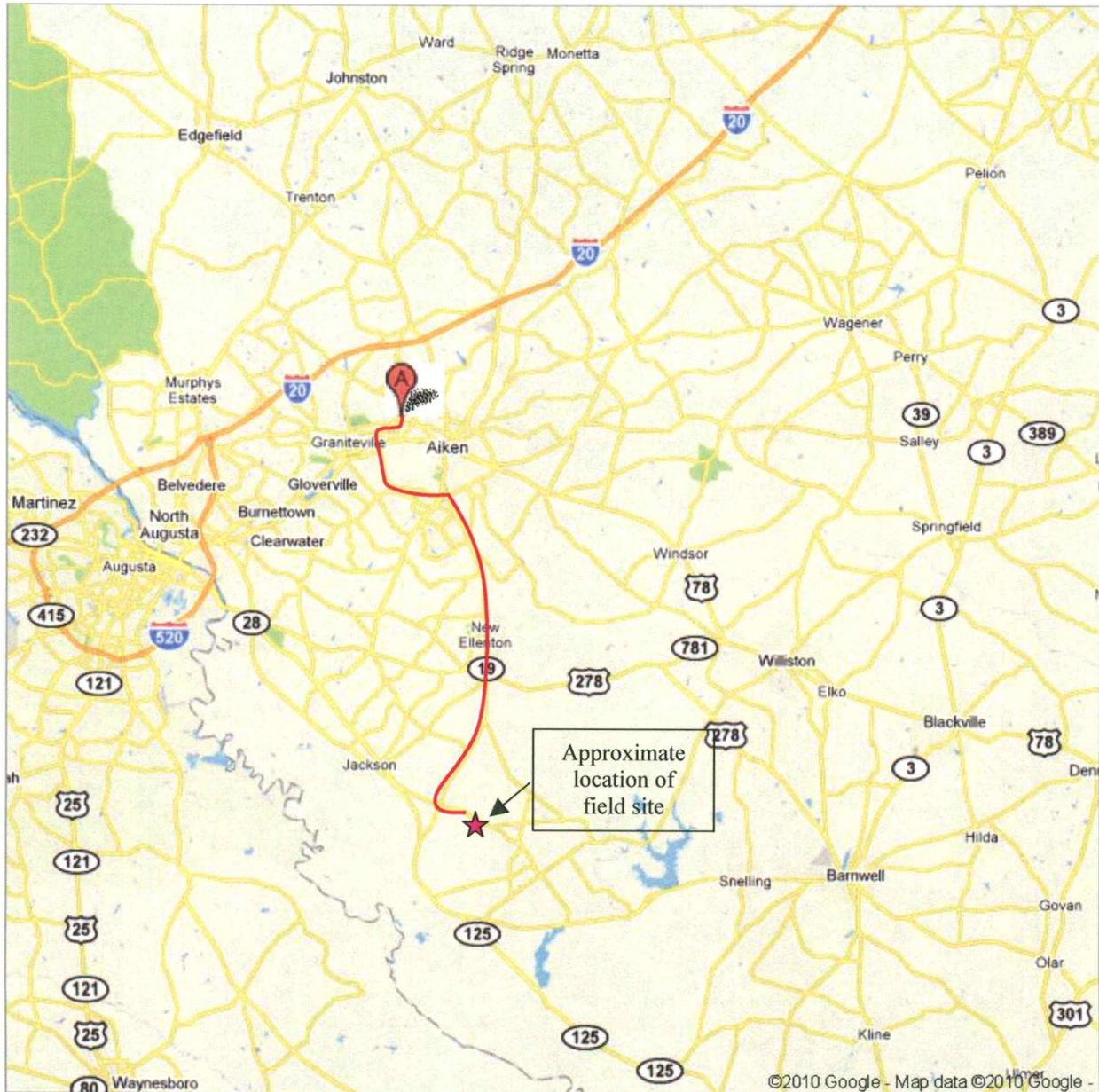


Emergency Route to Hospital

For on-site emergencies contact the SRS Operations Center at 803-725-1911. They can bring assistance to you (medical, fire, rescue, security, spill etc.). Otherwise, here is information for one hospital in Aiken and two from Augusta.

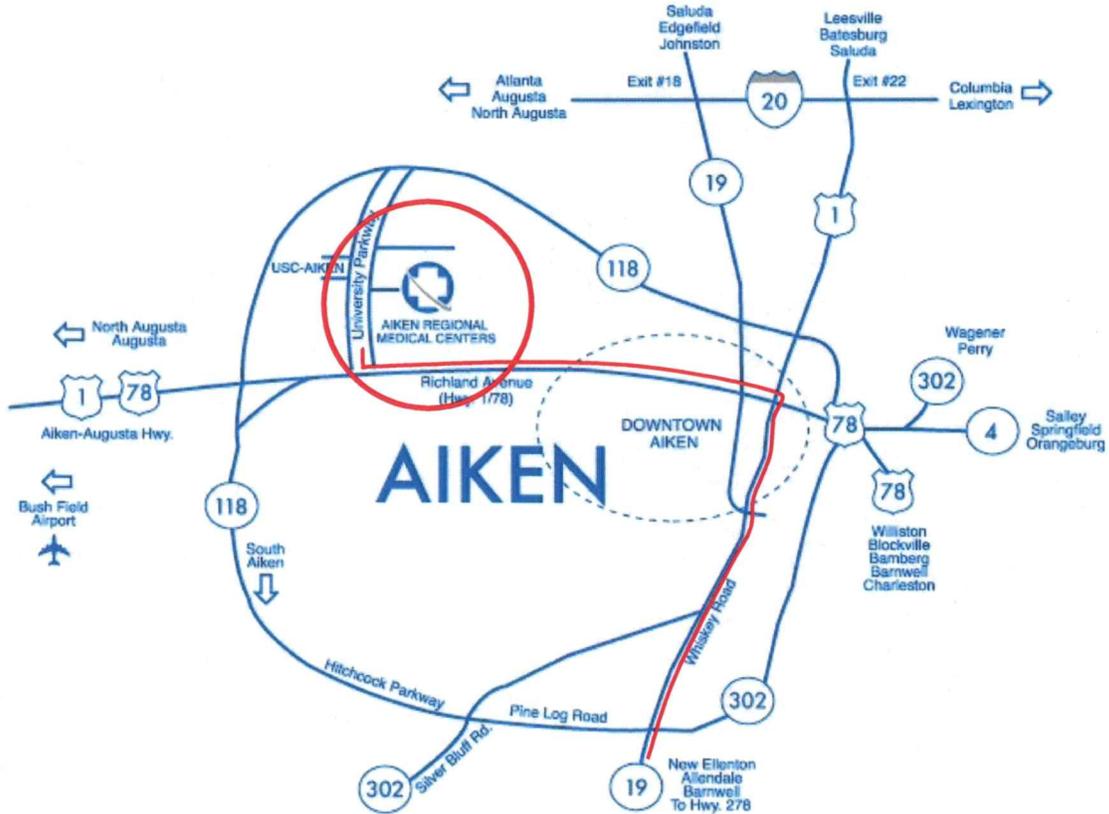
1. **Aiken Regional Medical Centers** (803) 641-5000
302 University Parkway
P.O. Drawer 1117
Aiken, SC 29802-1117

Map 1 of 2



1. **Aiken Regional Medical Centers** (803) 641-5000
302 University Parkway
P.O. Drawer 1117
Aiken, SC 29802-1117

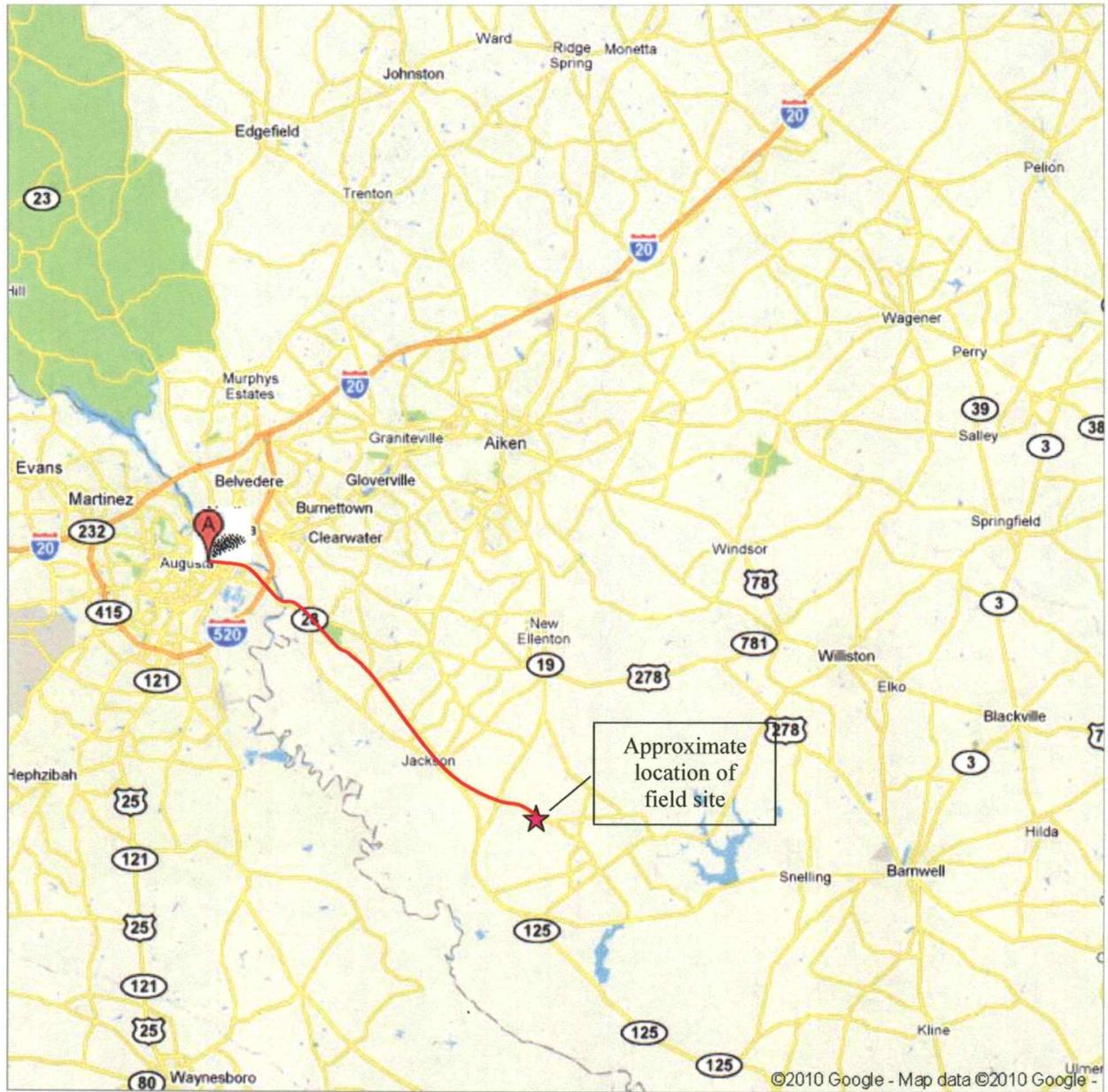
Map 2 of 2



2. **University Hospital**
1350 Walton Way
Augusta, GA 30901-2629

(706) 774-4156

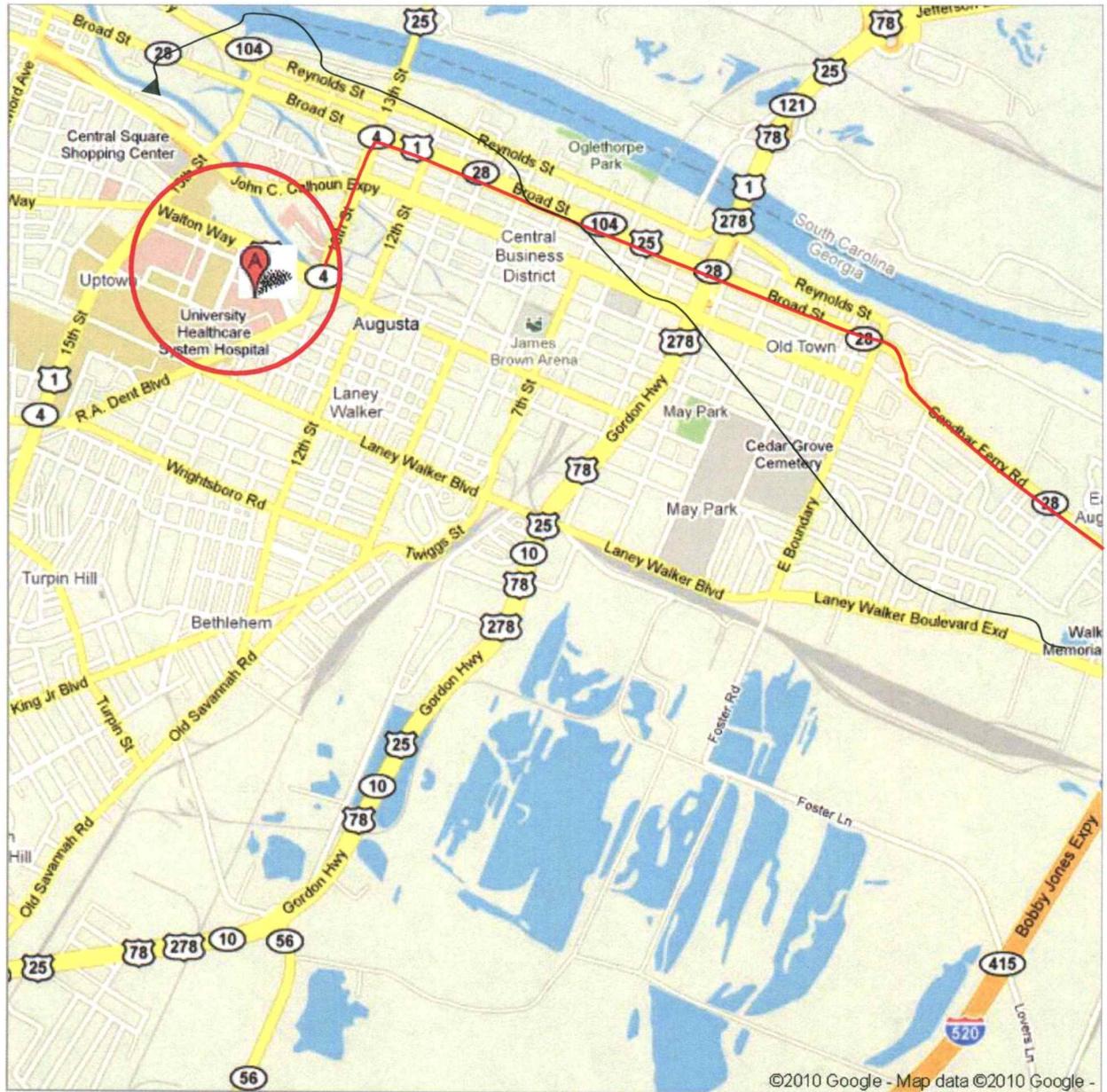
Map 1 of 2



2. **University Hospital**
1350 Walton Way
Augusta, GA 30901-2629

(706) 774-4156

Map 2 of 2



Procedures

Accidents/Injury: If any serious injury does occur, the appropriate authorities shall be notified immediately. All accidents will also be reported.

Several members of the KGS crew have certification in CPR/First Aid. This certification was received through participation in the “First Aid Basics” and “Adult CPR” programs presented by the Red Cross of Lawrence, Kansas. These classes are approved by the U.S. Department of Labor, Mine Safety, and Health Administration and meet or exceed OSHA requirements. OSHA certifications are provided by Genesis Environmental (formerly EPIC Training) and meet or exceed 29 CFR 1910.120.

The following persons are certified as indicated (strikethrough denotes no current certification):

Certified in:	First Aid	CPR	40hr OSHA	<u>Rick Miller</u>
Certified in:	First Aid	CPR	40hr OSHA	<u>Joe Anderson</u>
Certified in:	First Aid	CPR	40hr OSHA	<u>Tony Wedel</u>
Certified in:	First Aid	CPR	40hr OSHA	<u>Owen Metheny</u>
Certified in:	First Aid	CPR	40hr OSHA	<u>Brett Wedel</u>

Fire/Explosion: Upon notification of a fire or accidental explosion on site, the fire department or appropriate first responders shall be notified and all personnel shall leave the area. Since only Class “C” shotgun ammunition will be used as part of the program, local fire, police, and other governing authorities will not be contacted prior to the use of such devices on-site. On-site SRNL demolitions personnel will manage and respond to any situation. If Class “A” explosives were used, prior consultation and contact would be made with the appropriate emergency response groups.

At least one KGS vehicle will be on-site during the performance of all work. This vehicle will be used for medical evacuation of project personnel, if necessary.

Permits: All necessary and appropriate permits, fees, and licenses will be obtained by SRNL, with copies available on-site for inspection by local authorities.

VII. ALCOHOL AND DRUG POLICY

The University of Kansas (of which the KGS is a part) is a drug and alcohol free workplace with stringent controls and penalties associated with the use and distribution of controlled substances and alcohol in the workplace regardless of whether it is at a remote field location or on campus. The University of Kansas and Kansas Geological Survey consider alcohol and drug use (non-doctor prescribed) while “on-duty” a health and safety risk. The following section details the University and Survey policy as it relates to drug and alcohol abuse and misuse, enforcement of policies, and penalties for violating those policies.

Policy on Prevention of Illegal Drug and Alcohol Use on Campus and in the Workplace

The University of Kansas prohibits the unlawful possession, use, manufacture, or distribution of alcohol or drugs by students and employees on its property or as part of its activities. The University is committed to a program to prevent the illegal use of drugs and alcohol by students and employees. Any student or employee found to be using, possessing, manufacturing, or distributing controlled substances or alcohol in violation of the law on University property or at University events shall be subject to disciplinary action in accordance with applicable policies of the State of Kansas, the Board of Regents, and the University of Kansas. For employees, the University will take appropriate personnel action for such infractions, up to and including termination. Students who violate this policy will be subject to sanctions, which include suspension and expulsion from the University.

As a condition of employment, all employees of the University of Kansas shall abide by the terms of this policy statement and will notify the University of any criminal drug statute conviction for a violation occurring in the workplace no later than five days after such conviction. The University will, in turn, notify as appropriate, the applicable federal agency of the conviction within ten days of receipt of notification of the conviction. The University will initiate personnel action, up to and including termination, within thirty days of receiving notice of such conviction. Employees may also be required to satisfactorily participate, at their own expense, in a drug abuse assistance or rehabilitation program before being allowed to return to work. For purposes of this policy, “conviction” means a finding of guilt (including a plea of nolo contendere) or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the federal or state criminal drug statutes.

Kansas Law

Students and employees are reminded that illegal possession or use of drugs or alcohol may also subject individuals to criminal prosecution. The University will refer violations or proscribed conduct to appropriate authorities for prosecution. Kansas law provides that any person who violates the criminal statutes on controlled substances by possessing, offering for sale, distributing, or manufacturing opiates and narcotics, such as cocaine and heroin, shall be guilty of a drug severity Level 3 felony. For a conviction of such a felony, the court may sentence a person to a term of imprisonment in accordance with the Kansas Sentencing Guidelines Act and a fine of up to \$300,000. Unlawful possession of a depressant, stimulant or hallucinogenic drug is punishable as a Class A nonperson misdemeanor, with a penalty of imprisonment and a fine of \$2,500. Depressants include barbiturates, Valium, and barbital. Hallucinogens include LSD, marijuana, and psilocybin. State law classifies amphetamines and methamphetamines as stimulants. Kansas statutes also provide for criminal penalties for conviction of certain alcohol-related offenses. These penalties include imprisonment of up to six months and fines of up to \$1,000.

Federal Law

The Federal Controlled Substances Act provides penalties of up to life imprisonment and fines up to \$4,000 for intentional unlawful distribution or possession with intent to distribute controlled substances. For unlawful possession of a controlled substance, a person is subject to up to twenty years of imprisonment and fines up to \$5,000. Any person who unlawfully distributes a controlled substance to a person under twenty-one years of age or who distributes a controlled substance on or within 1,000 feet of the University may be punished by up to twice the term of imprisonment and fine otherwise authorized by law.

Health Risks

Accidents and injuries are more likely to occur if alcohol and drugs are used on University property or as part of University activities. Every year in the United States, over 200,000 people are treated in hospitals for drug-related accidents and mental and physical illness; another 25,000 die every year from drug-related accidents or health problems. Drug users can lose resistance to disease and destroy their health. Drug tolerance and psychological dependence can develop after sustained use of drugs. More specifically, physical dependency, heart problems, infections, malnutrition, and death may result from continued high doses of amphetamines. Chronic use of narcotics can cause lung damage, convulsions, respiratory paralysis and death. Depressants such as tranquilizers and alcohol can produce slowed reactions, a slowed heart rate, damage to liver and heart, respiratory arrest, convulsions, and accidental overdoses, because the abuser is unaware of how much the drug or alcohol has been taken. Use of hallucinogens may cause psychosis, convulsions, coma, and psychological dependency.

Alcoholism is the number one drug problem in the United States. Alcoholism takes a toll on personal lives by affecting finances, health, social relationships, and families. It can have significant legal consequences. Abuse of alcohol or use of drugs may cause an individual driving a motor vehicle to injure others and may subject the abuser to criminal prosecution. Drunk drivers are responsible for more than half of all traffic fatalities.

Counseling & Treatment Resources

At the University of Kansas, alcohol and drug counseling and treatment are available to students at the University Counseling and Psychological Services, Watkins Health Center, and the Psychological Clinic. The Student Assistance Center and the University Information Center are excellent sources for information about University and community resources for counseling and treatment. The Health Education Department of Watkins Health Center can provide further information about health problems and treatment related to alcohol and drug problems.

University employees may contact the Counseling and Psychological Services and the Psychological Clinic for counseling and treatment. Faculty and staff members may also contact the State LIFeline, a 24-hour toll-free assistance line (1-800-284-7575) for a referral. If referred through the LIFeline program, the first counseling session is paid by the State. Please refer to page 63 for additional resources.

Definitions

The term “controlled substance” as used in this policy means those substances included in Schedules I through V as defined by Section 812 of Title 21 of the United States Code and as further defined by the Code of Federal Regulations, 21 C.F.R. 1300.11 through 1300.15. The term does not include the use of a controlled substance pursuant to a valid prescription or other uses authorized by law.

The term “alcohol” as used in this policy means any product of distillation or a fermented liquid which is intended for human consumption and which is more than 3.2% alcohol by weight as defined in Chapter 41 of the Kansas statutes.

Policy on Substance Abuse

The University recognizes that problems related to the abuse of substances such as alcohol and drugs may be resolved through cooperation between the employer and the affected employee. The policy set forth here for handling substance-abuse problems is intended to enhance cooperation and to protect both the individual and the University.

The University has a right to expect that employees will perform their jobs appropriately and to insist that job-performance standards be met. The University may properly intervene only when impairment affects job performance.

- These problems are defined as those in which an employee’s use of alcohol or drugs has become part of a pattern of deteriorating job performance.
- This policy does not supersede any regulations or standard administrative practices applicable to job performance requirements.
- It is the employee’s right and responsibility to seek professional assistance for a substance-abuse problem.
- All employees, especially department chairpersons and supervisors, should work to engender an enlightened attitude toward and a realistic recognition of the nature of substance abuse and to encourage employees to take advantage of available treatments whenever needed.
- Responsibility for implementing this policy rests with all department chairpersons and supervisory personnel. Procedures must be followed to assure that no employee with a substance-abuse problem will have his or her job security or promotional opportunities jeopardized by a request for diagnosis and treatment.
- A chairperson or supervisor may wish to consult with a professional in the treatment of substance-abuse *WITHOUT IDENTIFYING THE CONCERNED EMPLOYEE* before attempting intervention with the employee.
- Before attempting intervention, a supervisor of classified staff should discuss with his or her own supervisor and the Department of Human Resources the rules and requirements protecting the rights of the person believed to be suffering from alcoholism or drug abuse.
- Departmental chairpersons and supervisors should not attempt diagnosis. When an employee’s job performance is deteriorating and there is reason to suspect that the source may be the use of alcohol or drugs, the chairperson or supervisor will meet informally with the employee, make an appropriate referral to a professional agency and encourage him or her to seek help for the problem. At this meeting, a date will be set by which improvement in job performance will be assessed.
- The employee is responsible for complying with the referral for diagnosis and for cooperating in any prescribed treatment. He or she should be assured that the referral agency will treat all discussions with strict confidentiality. (Most agencies will, with the consent of their client, report to a supervisor that the client has followed up on a referral.)
- Between the time of the meeting and the date set for assessing improvement in job performance, the chairperson or supervisor will continue to monitor the performance but will in all other respects leave the initiative for further discussions to the employee.

- If, by the date set at the first meeting, the employee's job performance has improved to an acceptable level, no further official action is required.
- The University expects that employees with a possible problem of substance abuse, even in its early stages, will be encouraged to seek diagnosis and treatment. The employee should be assured that seeking help will not interfere with job status, promotional opportunities or other privileges.
- If the job performance remains below accepted standards and the employee has refused to accept diagnosis and treatment, or has failed to respond to treatment, the chairperson or supervisor should suggest that he or she use one of the options available to any employee with an illness that interferes with job performance:
 - a. Being placed on sick leave. This option is for those with accrued leave. It would allow the employee to enter an inpatient treatment center and adopt a treatment program. Under this option, a written plan should be developed between the staff member and the University and properly executed by the chairperson or supervisor in consultation with Human Resources. The plan will spell out specifically the terms of the employee's return to his or her duties at the end of treatment (e.g., how the University is to be informed of the progress made in treatment and the appropriateness of a return to duty and how job performance is to be assessed).
 - b. Being granted a leave of absence without pay for up to twelve months. This option is for classified employees, upon approval of the Department of Human Resources.
 - c. Taking early retirement. This option is for those otherwise eligible. It is, of course, a drastic solution for both the individual and the University.
 - d. Resigning. If a classified employee can make no progress, recommendations to demote or dismiss are to be submitted to the Department of Human Resources for review and action.

Information revealed by the employee while receiving professional services will remain confidential and separate from University employee records. All record-keeping and access procedures will meet the federal regulations governing the confidentiality of patient records and the state law protecting treatment records.

VIII. TASK SPECIFIC HAZARDS

The purpose of the geophysical investigation is to acquire seismic data that can be used to extract key physical properties of the near surface.

Downhole Auger Gun (not on-site at SRNL)

One of the geophysical tests proposed to be employed requires the use of an auger gun (shotgun type device) to introduce energy into the ground (Healey et al., 1991). This device consists of a small skid-steer loader with an attached auger/screw. The operation consists of (1) screwing the hole into the ground using the auger, (2) firing the center bit, (3) loading the shell in the firing tube and lowering the tube until it is in place, (4) firing the gun by reaching the top of the firing tube with a small hammer, and (5) unscrewing the auger from the ground. The auger gun uses a *blank* 8-gauge or 12-gauge shotgun shell fired below the ground surface in a downward direction. The device is built to minimize any danger to persons handling and moving the device, as well as avoid leaving any residual materials in the ground. The shotgun shells will be secured in a specially designed steel, lockable, explosives box attached to a vehicle at all times. The operation/safety rules and regulations for the auger gun are presented as an appendix to this plan.

30.06 Downhole Projectile Source (not on-site at SRNL)

Experiments will be carried out with a downhole projectile source. This source is a specially modified 30.06 rifle designed to be loaded and fired while secured to the ground in a downward direction. The firing tube is lowered into a hole in the ground. A standard 30.06 rifle shell is loaded in the above-ground breech and then detonated so that the projectile wave (blast), gas, projectile, and shrapnel are contained within the hole. The procedure calls for 1) drilling a hole, 2) placing the firing tube in the hole (covering the end of the tube with a finger cot), 3) loading a 30.06 round into the above-ground breech, 4) locking the bolt in place, 5) assuming the firing position, 6) detonation, and 7) removal from the hole. The device has successfully and safely fired over 30,000 rounds since 1985. All rounds are stored in a secure steel box.

Sledgehammer

The sledgehammer is a well understood and available source of acoustic energy. The sledgehammer will be used with a hard-wire time break and will be operated by physically capable KGS staff members. An area twice the length of the hammer handle will be cleared prior to use. The hammer will be 1) raised above the operator's head using a two-hand grip, 2) accelerated with full arm extension toward the ground, 3) contact striker plate with hammer, and 4) lifted into split two-hand carry grip. Activities such as changing broken handles and attaching new hammer switches should only be done by experienced KGS staff. A minimum clear area directly in front of the operator of at least 25 ft must be maintained in case operator loses grip on hammer or hammer head breaks free from the handle. Gloves, safety glasses, steel toed boots, and hearing protection are required for operating this source.

Weight Drop

The accelerated weight drop is a high energy, hydraulically operated source. All moving parts are shielded and designed to minimize risk of injury to operator and bystanders. By its very nature the weight drop represents a hearing danger. The source is powered by a standard

commercial loader. A single operator runs the device from inside a protective cab. Operation simply requires 1) the base plate to be placed on the ground and loader/weight drop weight applied for hold down, 2) idle at medium rpm and initiate the hydraulic valve, 3) weight is raised against resistive force (bungies), 4) dropped once maximum pre-set height is reached, and 5) source is hydraulically lifted and carried to next shot point by tracked loader. The source is sufficiently shielded that only in a very unusual situation will pieces of the source come free from the source and represent a threat to safety. By maintaining a minimum 30 ft for hearing safety, the danger of fragments is all but eliminated.

Bolt LSS-6 Land Air Gun (not on-site at SRNL)

The Bolt Land Air Gun has been in routine use in oil exploration for more than 20 years. The device consists of a 3-cylinder diesel engine, a four-stage air compressor, and an enclosed water filled chamber (housing the “gun”). The safe operation of the gun is well documented in the operator’s manual. The entire device is transported as the bed of an F-350 4-wheel drive truck. The 3-cylinder diesel engine powers not only the air compressor but also a hydraulic system designed to raise and lower the gun chamber to the ground. The gun chamber is hydraulically lowered to the ground with the weight of the truck used to hold the device to the ground. The gun is electrically detonated from the cab of the truck with no moving parts exposed during detonation. The engine and air compressor are enclosed in a protective shroud. The gun generates a thump to the ground surface approximately equivalent to 1/3 of a pound of high explosive buried 3 to 4 ft below the ground surface.

NOT AT SRNL

Control Measures

- 1) The careful and safe operation of the standard 4-wheel-drive truck is well documented in the owners manual.
- 2) It is critical to always be aware of anyone near the device.
- 3) The raising of the gun for transport and lowering of the gun just prior to detonation is done with only part of the gun visible to the operator. It is critical that no one comes within 50 ft of the gun while in operation.
- 4) Hearing protection (down 30 dB) is required by anyone within 50 ft of the truck.

IVI Minivib

The MiniVib is a hydraulically powered vibrator designed to shake the ground in a very controlled fashion over about a 4 to 8 second time duration. The device is hydraulically powered with no moving parts that possess an entanglement potential. Energy is delivered to the ground by this device through a hydraulically powered pad approximately 3 ft in diameter mounted on the belly of the vehicle. The pad is lowered from beneath the vehicle using the vehicle’s weight as hold-down pressure. The pad is vibrated by a hydraulic servo delivering frequency-varying energy to the plate over a preset time duration. No moving parts are exposed with the maximum movement of the pad relative to the vehicle less than 2 in.

Control Measures

- 1) This vehicle is center articulating and requires care when turning that no one is within 20 ft of the vehicle.
- 2) Safe operation of the vehicle is documented in the operator’s manual provided by the manufacturer.
- 3) Hearing protection is required within 25 ft of the vehicle.
- 4) All shields are to remain in place while the vehicle is in operation

- 5) Hydraulic pressures of more than 3000 psi are routine during operation. No maintenance or service will take place while vehicle engine is running.
- 6) Quick inspection is necessary prior to lowering the pad. Real-time video feed to monitor mass and baseplate and backup camera provide operator with key inspection points.

50-cal. Downhole (not on-site at SRNL)

The downhole .50-caliber seismic source consists of a .50-cal. rifle bolted to a 0.6 cm thick steel plate. The rifle itself is a standard .50-cal. breech and bolt, built by Texas Gun and Machine Company, attached to a standard .50-cal. machine gun barrel. Machined grooves in the barrel are used in conjunction with a pressure clamp to attach the rifle to a 30 cm by 90 cm steel plate. The rifle barrel is lowered into a 90 cm to 100 cm diameter borehole 1 cm in diameter until the plate is flush with the ground surface. The steel plate acts as a ground seal and a platform to stand on while firing the gun. The weight of the shooter on the plate and the snug fit of the barrel to the borehole walls help seal the gun to the ground. The rifle can be equipped with a source sensor or closure switch to generate a time break. Firing can be done either electrically by solenoid or manually by pulling the trigger. The downhole .50-cal. weighs about 30 kg and is easily two-person portable. Safety rules for the use of the .50-cal. seismic gun are presented as an appendix to this plan.

Paintball Impulsive Seismic Source

A standard of-the-shelf paintball marker has been modified to impart a series of high frequency air pulses into the ground through a specially modified barrel. The pulse sequence is electronically controlled to optimize its use as a coded seismic source. The barrel was designed and built at the Kansas Geological Survey and it has no single opening at the end of the barrel. The barrel is plugged at the end with around 50 small holes drilled in the sides of the barrel to release the gas pulse below ground surface.

The seismic paintball source is pushed by hand to a predetermined and measured depth (~6 inches). The discharge valve is electronic and controlled by a computer circuit. Operation of the commercially available portion of this source is completely consistent with manufacturer's instructions as they relate to the use, storage, and transportation of the compressed air cartridges. This seismic source cannot launch a projectile of any kind. This source is treated like all other sources—with maximum concern for safety.

General

Field operations will consist of geophysical investigations to determine the effectiveness of shallow seismic survey methods at this site to delineate the structures and stratigraphy. The introduction of acoustic energy into the ground in a controlled fashion involves equipment or material with the potential to do harm if not properly handled and operated. Good common sense, training, and experience are the rule for seismic field operations. These can usually be easily accomplished if manufacturers' operating and use instructions are followed.

The field investigations will involve project personnel performing geophysical surveys of the study area utilizing the aforementioned pressure pulse, impacting, and vibratory seismic sources. The principal hazards associated with the use of sources mentioned here consist of handling or moving the equipment, improper use, fragments from high pressure impacts, and elevated sound levels.

IX. ACTIVITY HAZARD ANALYSIS

A. Work Item: Traffic Control

All regulation concerning right-of-way and traffic directions will be observed.

Specific Hazards–The specific hazard involves accidents with vehicular traffic within the survey area.

Control Measures–All personnel will minimize activity along trafficked roadways to the extent possible. Traffic cones will be used to identify and buffer the work area with respect to on-coming traffic. Care will be used while working on or around driveways. If appropriate, signs and/or flagmen will be used to alert and slow traffic through the survey area. Flagmen will be used along roadways with limited sight areas or speed limits exceeding 45 mph. For sites with traffic speeds above 45 mph and work requiring shoulder access, lane closure must be considered.

B. Work Item: MiniVib

The MiniVib is a hydraulically powered vibrator designed to shake the ground in a very controlled fashion over about a 4 to 8 second time duration. The device is hydraulically powered with no moving parts that possess an entanglement potential. Energy is delivered to the ground by this device through a hydraulically powered pad approximately 3 ft in diameter mounted on the belly of the vehicle. The pad is lowered from beneath the vehicle using the vehicle's weight as hold-down pressure. The pad is vibrated by a hydraulic servo delivering frequency-varying energy to the plate over a preset time duration. No moving parts are exposed with the maximum movement of the pad relative to the vehicle less than 2 in.



Control Measures

- 1) This vehicle is center articulating and requires care when turning that no one is within 20 ft of the vehicle.
- 2) Safe operation of the vehicle is documented in the operator's manual provided by the manufacturer.
- 3) Hearing protection is required within 50 ft of the vehicle.
- 4) All shields are to remain in place while the vehicle is in operation
- 5) Hydraulic pressures of more than 3000 psi are routine during operation. No maintenance or service will take place while vehicle engine is running.
- 6) Quick inspection is necessary prior to lowering the pad.

C. Work Item: Accelerated Weight Drop



The accelerated weight drop (AWD) generates acoustic energy by accelerating a 50 to 100 lb weight through a 2 ft stroke impacting an 18 in diameter steel plate held to the ground surface by the weight of a skid-steer style loader. The weight is accelerated within an enclosed steel guide. The drive mechanism consists of a hydraulic motor turning a set of sprockets that deliver power to a cycling lift arm that pulls the weight against the resisting force of an industrial rubber band. Simply envisioned, this device is analogous to a sling-shot. All moving parts are shielded, with the contact area between

the weight and plate sufficiently enclosed to avoid and possibility of debris becoming airborne and representing a risk to the operator or bystanders.

Control Measures

- 1) The operator wears hearing protection (30 dB down) while the loader is running.
- 2) No bystanders can be within 30 ft of the device while it is in operation and within 50 ft without hearing protection.
- 3) All shields are to remain in place while in operation. Routine maintenance, requiring removing shields, can take place only when the loader engine is off.
- 4) The operator can exit the vehicle only when the weight drop is in the full down position and solid contact is made with the ground surface.
- 5) Operation of the loader will be consistent with those published in the owner manual of the Case 1225 UniLoader.

D. Work Item: All Terrain Vehicles/Utility Vehicles (UTVs)

UTVs that could be on site include the 4x6 John Deere Gator and three Polaris 4x6s. These UTVs all serve a very specific purpose and are critical to smooth and efficient operations. The UTVs never obtain speeds in excess of 15 mph and therefore do not represent risk of injury due to excessive speeds. The tip-over potential is minimized by the 6-wheel design of the vehicles, but tip-over potential does exist. Care is always taken to properly load the vehicles and only traverse grades within the acceptable limits of the vehicle as defined by the manufacturer.



- 1) The Gator is designed to carry the seismograph and 12-volt batteries. This vehicle never travels more than 10 mph and spends over 99% of its time parked along the survey line.
- 2) The Polaris is the primary work horse of the UTVs. It transports cables and geophones in a 3x3 steel box mounted behind the seat. The vehicle has 6 wheels with 4 drive wheels. The 6-wheel design makes the vehicle very stable with a large safe payload capacity (>700 lbs). This vehicle never travels more than 15 mph and is therefore at low risk of injury from excessive speed.

Control Measures

- 1) Every UTV operator shall possess a valid Kansas driver's license and shall have completed an appropriate training course prior to operation of the vehicle. The following persons have training and authorization to operate the UTVs: Rick Miller, Joe Anderson, Tony Wedel, Ben Rickards, Owen Metheny, Tyler Schwenk, Justin Schwarzer, and Craig Hendrix.
- 2) The manufacturer's recommended payload shall not be exceeded at any time.
- 3) Gloves and an approved motorcycle helmet shall be worn at all times while operating a UTV at speeds in excess of 15 mph.
- 4) UTVs are to be used to haul equipment and supplies only.
- 5) Only UTVs with six or more wheels are permitted to be used.
- 6) All UTVs shall be equipped with a warning signal device (horn).
- 7) UTVs will be operated and maintained in accordance with the manufacturer's operating manual.

E. Work Item: Slide Hammer and Sledgehammers



A sledgehammer is a large metal mass, elongated and fitted to a wood or fiber shaft.

Specific Hazards—Uncontrolled swing and fragmenting of hammer or plate or handle/mass failure.

Control Measures—Only experienced operators, power hammer into ground at a controllable level, no bystanders within the distance of two hammer handle lengths side-to-side and behind and 25 ft in front.

F. Work Item: *Geophones*

Geophones are electromechanical devices that respond to earth movement, producing an electric pulse representative of the ground motion. They are coupled to the ground with 3-5 inch spikes.



Specific Hazards

- 1) Geophone spikes can puncture the skin and string or groups of geophones can be excessively heavy and represent a lifting hazard.

Control Measures

- 1) Keep geophone strings away from legs while walking and carrying.
- 2) Never carry more than one hasp of geophones per arm.
- 3) Wear gloves and safety shoes to protect extremities from smash or crush hazards.

G. Work Item: *Paintball Impulsive Seismic Source*

Specific Hazards—Uncontrolled release of pressurized air.

Control Measures—Store cartridges in a secure area and keep full cartridges separated from empty. Installation of cartridges will be done with appropriate safety gear including gloves, earplugs, and safety glasses. Canisters will be kept closed and always pointed away from operator.



X. TRAINING

At least one KGS personnel working at the site in connection with the project shall have received hazardous waste worker training in accordance with 29 CFR 1910.120(e), be certified in First Aid, and CRP trained. This includes 40-hour initial training and yearly 8-hour refresher training. All KGS personnel will have appropriate experience and training with each source, vehicle, and method used.

XI. PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) protects employees from the hazards and potential hazards they are likely to encounter as identified during previous site characterization activities. PPE consists of a combination of protective clothing and respiratory protection equipment. Selection of PPE is based on an evaluation of the performance characteristics of the PPE relative to the requirements of the site and the task specific conditions and duration. The level of protection is upgraded when site monitoring or conditions indicate that increased protection is necessary to reduce employee potential for exposure.

Based on the available information assessing the current condition of the sites, minimal skin protection is required for general access. The prescribed working uniform for all personnel engaged in activities related to the project is a modified EPA level D and shall consist of:

- Long-sleeved shirts and full-length pants
- Leather steel toed safety boots
- Eye protection*
- Hearing protection as required by OSHA for certain tasks (identified by work item)
- Orange vests along roadways (unlikely necessary for this project)

No respiratory protection equipment is required. At the present time based on all available information, the atmosphere contains no known hazards. There is no expected potential for inhalation or contact with hazardous levels of any chemical.

Added protection from the sun and insects might be necessary. All workers will be encouraged, but not required, to use sunscreen and insect repellent. These protective chemicals will be available for use on-site.

*When operating sledgehammer or paintball source.

XII. SAFETY ANALYSIS

The following analysis list postulates hazards, consequences of those hazards, and the means of prevention or mitigation of each hazard associated with this survey activity.

A. Mobilization – Loading & Unloading

<i>Potential Hazards</i>	<i>Recommended Safe Procedures</i>
Sprained back	Use proper lifting technique, get help
Backing vehicle into equipment or personnel	Use spotter, back-up alarms on vehicles. Driver to insure that rear-view mirrors are adjusted properly.

B. Mobilization – Travel To / From Site

<i>Potential Hazards</i>	<i>Recommended Safe Procedures</i>
Traffic accidents	Use proper defensive driving technique.
Livestock or other animals on road	Watch sides of the road, especially at dawn & dusk; try to avoid larger animals.
Equipment falling off of trucks	Check load before leaving shop or overnight lodging, after first 25 miles, then after every 150 miles.
Losing control or falling asleep at the wheel	Watch driving speed versus road condition and posted legal limits. Get good rest, use buddy system on long drives, pull over if necessary.

C. Vibroseis Operations – See also IAGC Manual

<i>Potential Hazards</i>	<i>Recommended Safe Procedures</i>
Vibrating over buried natural gas, electric, or telephone lines	Use utility location if needed before commencing work. Look for posted notices of buried utilities.
Lightning in area	If thunder is within 5 seconds of lightning, shut down operations, get into truck cab.
Slips, trips, falls	Clear work area of obstacles, be sure of your footing.

D. Working Along Highways – This section highlights some of the more common issues. It is not meant to be a guide to traffic control, which should be conducted only by qualified personnel. Traffic signs, cones, and flaggers should be used as appropriate when working on road shoulders. Signs, cones, and flaggers must be used when working in a closed traffic lane.

<i>Potential Hazards</i>	<i>Recommended Safe Procedures</i>
Pedestrian / Automobile accident	Wear high-visibility vests. Watch traffic. Don't assume traffic control will keep cars & trucks out of area. Work <u>facing</u> traffic, <u>not</u> back to traffic. If traffic drifts into the lane you are working in, drop what you are doing and get away to safety.
Slips, trips, falls	Clear work area of obstacles, be sure of your footing.

E. Laying Out and Picking Up Seismic Cables and Geophones

<i>Potential Hazards</i>	<i>Recommended Safe Procedures</i>
Slips, trips, falls	Clear work area of obstacles, be sure of your footing.
Back or neck injury	Get assistance with heavy cables, use proper lifting technique.
Tangled cables	Use proper winding / unwinding technique, get help with untangling heavy cable or untangling cable where footing is slippery or steep.
Lightning in area	If thunder is within 5 seconds of lightning, get away from cables, shut down operations, disconnect cables from any recording equipment mounted in truck, get into truck cab. Keep an eye on the weather if thunder storms are forecast.

F. Environmental Concerns

<i>Potential Hazards</i>	<i>Recommended Safe Procedures</i>
Fuel & hydraulic fluid leaks	Check equipment for leaks and repair as needed. Use absorbent materials, clean up any spills.

XIII. ENVIRONMENTAL IMPACT ANALYSIS

The environmental impact of this activity has been evaluated and determined minimal (“small footprint”) at more than six U.S. Government facilities (Y-12 ORNL, Oak Ridge, TN; WAG-10, ORNL, Oak Ridge, TN; Paducah Gaseous Diffusion Plant, Paducah, KY; Nevada Test Site, Las Vegas, NV; Fort Ord, CA; Berkeley Nat’l Lab, Berkeley, CA; INEL, Idaho Falls, ID) as well as multiple BLM and DOD sites.

XIV. HANDLING AND DISPOSAL OF UNEXPLODED ROUNDS

The handling of live ammunition will be in complete compliance with sections VIII.A and B and seismic gun operation procedures (both sections of this report). In the event a round does not detonate using standard operation procedures, the seismic source will be left in place undisturbed for a minimum of 3 minutes. After this initial 3 minutes, the sleeve will be extracted to insure minimal contact with operators. The unexploded round will be placed in the metal container used for the storage of spent rounds. If the round is an 8 gauge it will remain in the sleeve for a minimum of 20 minutes after placement in the metal can prior to being placed in a metal can and locked in the steel containers attached to the truck. If it is a 50-cal. round it will remain in the can for 20 minutes before it will be removed and re-stored in a metal can in the metal transport boxes attached to the truck. The unexploded rounds will then be delivered to SRNL demolitions staff for disposal by SRNL.

XV. REFERENCES

Applicable portions of the following documents form the basis for this safety plan.

From the United States Department of Energy:

DOE Order 5480.16, *Firearms Safety*.

DOE Report DOE/EV/06194-3, *DOE Explosives Safety Manual*.

ID Appendix 0550, *Standard Operational Safety Requirements*, Part III, Subpart I, “Explosives”

From the United States Department of Defense:

DOD 6055.9-STD, *Ammunition and High Explosive Safety Standards*

AR-385-63, *Safety Policies and Procedures for Firing Ammunition for Training, Target Practice, and Combat*

SAFETY ANALYSIS OF PROJECTILE SEISMIC SOURCES

<u>Potential Hazard</u>	<u>Consequences</u>	<u>Mitigation/Prevention Mechanism</u>
Lost/Stolen Ammunition	Personal injury or property damage from unauthorized use.	Implementation of system to issue daily ammunition allotment and control inventory, in addition to physical control of ammunition at all times.
<u>During Loading/Unloading:</u>		
Dropped cartridge	Personal injury from accidental discharge.	Assure training of personnel in proper handling of live ammunition.
Introduction of foreign material into breech and barrel	Damage to barrel, breech, or bolt and resulting personal injury.	Assure training of personnel in proper handling of ammunition and process inspection of ammunition and seismic gun.
<u>During firing:</u>		
Muzzle Air Blast	Personal injury from flying rocks, soil, debris.	Close fit of barrel in boreholes suppresses muzzle air blast and its effects.
Ricochet	Personal injury from ricocheting projectile or fragments.	Design and use of seismic gun prevents the escape of projectile or fragments from the borehole with sufficient energy to cause personal injury.
Flashburns	Burns from muzzle flashes	Discharge into earth or containment device suppresses muzzle flash.
Misfire	Personal injury from subsequent accidental discharge of misfired round.	Assure training of personnel in proper handling and disposal of misfired ammunition.

NOT AT SRNL

SAFETY ANALYSIS OF PROJECTILE SEISMIC SOURCES

<u>Potential Hazard</u>	<u>Consequences</u>	<u>Mitigation/Prevention Mechanism</u>
Accidental discharge of seismic gun	Injury to unintended target.	Assure that operating procedures prevent transport of loaded seismic gun.
Plugged barrel - dirt	Damage to barrel and resultant personal injury.	Assure that operating procedures include thorough bore sighting between shots and/or probing with dowel after installation in borehole.
Plugged barrel - water	Damage to barrel and resultant personal injury.	Assure that operating procedures require inspection of borehole for water, and sealing of end of barrel with tape or other means if encountered in borehole.
Barrel disengagement from plate	Personal injury to crew member(s) by flying rifle.	Implement an inspection/maintenance procedure for the barrel-to-attachment.
Breech disengagement from barrel	Personal injury to crew member(s) by flying breech and bolt groups.	Implement an inspection/maintenance procedure for the breech-to-barrel attachment.
NOT AT SRNL		
<u>During Transport</u>		
Accidental discharge	Injury to unintended target.	Assure that operating procedures permit loading only after seismic gun is installed in borehole.
Accidental drop or collision	Damage to barrel or firing mechanism	Assure that operating/transportation procedures require thorough inspection of seismic gun after drop or collision incidents. Seismic gun is disassembled and stored in special compartment during vehicular transport.

**Kansas Geological Survey
Incident Report Form**

Date of incident: _____

Location of incident: _____

Was anyone injured? Yes No If yes, name(s) of injured person(s):

Uninjured person(s) involved in incident: _____

Other witnesses (not involved): _____

Equipment involved in incident: _____

Narrative of what happened (continue on reverse of this page and draw a diagram if it helps explain what happened):

Site Safety Officer

**Kansas Geological Survey
Incident Report Form**

Date of incident: _____

Location of incident: _____

Was anyone injured? Yes No If yes, name(s) of injured person(s):

Uninjured person(s) involved in incident: _____

Other witnesses (not involved): _____

Equipment involved in incident: _____

Narrative of what happened (continue on reverse of this page and draw a diagram if it helps explain what happened):

Site Safety Officer

**Kansas Geological Survey
Incident Report Form**

Date of incident: _____

Location of incident: _____

Was anyone injured? Yes No If yes, name(s) of injured person(s):

Uninjured person(s) involved in incident: _____

Other witnesses (not involved): _____

Equipment involved in incident: _____

Narrative of what happened (continue on reverse of this page and draw a diagram if it helps explain what happened):

Site Safety Officer

American Red Cross



This recognizes that **Rick Miller** has completed the requirements for

CPR- Adult conducted by

Douglas County Chapter
Date Completed **6-2-2010**
The American Red Cross recognizes this certificate as valid for **one** year(s) from completion date.

American Red Cross



Together, we can save a life

This recognizes that **Rick Miller** has completed the requirements for

Standard First Aid

conducted by

Douglas County Chapter
Date completed **March 31, '08**
The American Red Cross recognizes this certificate as valid for **three** year(s) from completion date

American Red Cross



This recognizes that **Joe Anderson** has completed the requirements for

CPR- Adult conducted by

Douglas County Chapter
Date Completed **6-2-2010**
The American Red Cross recognizes this certificate as valid for **one** year(s) from completion date.

American Red Cross



Together, we can save a life

This recognizes that **Joe Anderson** has completed the requirements for

Standard First Aid

conducted by

Douglas County Chapter
Date completed **March 31, '08**
The American Red Cross recognizes this certificate as valid for **three** year(s) from completion date

American Red Cross



This recognizes that **Anthony Wedel** has completed the requirements for

CPR- Adult conducted by

Douglas County Chapter
Date Completed **6-2-2010**
The American Red Cross recognizes this certificate as valid for **one** year(s) from completion date.

American Red Cross



Together, we can save a life

This recognizes that **Tony Wedel** has completed the requirements for

Standard First Aid

conducted by

Douglas County Chapter
Date completed **March 31, '08**
The American Red Cross recognizes this certificate as valid for **three** year(s) from completion date

American Red Cross



This recognizes that **Owen Metheny** has completed the requirements for

CPR- Adult conducted by

Douglas County Chapter
Date Completed **6-2-2010**
The American Red Cross recognizes this certificate as valid for **one** year(s) from completion date.



Date Issued: 1998-05-05
Supersedes: 1998-03-03
845/20

TEXACO
MATERIAL SAFETY DATA SHEET

NOTE: Read and understand Material Safety Data Sheet before handling or disposing of product.

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MATERIAL IDENTITY

Product Code and Name:
26020 UNLEADED PREMIUM GASOLINE
Chemical Name and/or Family or Description:
Automotive Lead-Free Gasoline

Manufacturer's Name and Address:
TEXACO REFINING AND MARKETING, INC
P.O. Box 7812
Universal City, CA 91608

Telephone Numbers:
Transportation Emergency-Company : (914) 831-3400
CHEMTREC (USA): (800) 424-9300
In Canada : (800) 567-7455
-Company : (914) 831-3400
Health Emergency : (914) 838-7204
General MSDS Assistance : (713) 432-3383
Texaco FaxBack System : (914) 838-7336
Technical Information -Fuels : (800) 782-7852 (Option 4)
-Lubricant/: (800) 782-7852 (Option 4)
Antifreezes/Fuel Additives
-Solvents/Chemicals : (800) 876-3738

This Material Safety Data Sheet may be used for the following products for Hazard Communications purposes only; not intended to imply identical performance/technical specifications:

- 00313 TEXACO POWER PREMIUM W/ OXY 93
- 00314 UNLEADED PREMIUM (w/OXYGENATES)
- 00318 UNLEADED PREMIUM GASOLINE 92 OCTANE (7.8#)
- 00319 UNLEADED PREMIUM GASOLINE 93 OCTANE (7.8#)
- 00328 TEXACO POWER PREMIUM (RVP 7.8#)92
- 00332 TEXACO POWER PREMIUM (RVP 7.8#)93
- 00335 CALIFORNIA UNBRANDED UNLEADED PREMIUM
- 00347 TEXACO POWER PREMIUM 93
- 00348 PREMIUM UNLEADED GASOLINE 91
- 00350 PREMIUM UNLEADED GASOLINE BG
- 00355 UNLEADED PREMIUM WITH ETHANOL
- 00360 TEXACO POWER PREMIUM 92
- 00361 PREMIUM UNLEADED GASOLINE 93 OCTANE
- 00363 TEXACO SUPER UNLEADED WITH ETHANOL
- 00364 PREMIUM UNLEADED GASOLINE
- 00368 TEXACO POWER PREMIUM W/ OXY 92
- 00370 PREMIUM UNLEADED GASOLINE W/ETHER OXY
- 00378 TEXACO PREMIUM UNLEADED WITH ETHANOL
- 00379 TEXACO SUPER UNLEADED WITH ETHANOL
- 00386 MARYLAND GRADE PREMIUM UNLEADED GASOLINE
- 00486 TEXACO POWER PREMIUM W/OXY (NON-RFG)ETOH 7.7 BLSK
- 00488 TEXACO POWER PREMIUM W/OXY (NON-RFG)ETOH 10.0 BLSK
- 00498 UNLEADED PREMIUM GASOLINE w/7.7% ETHANOL
- 00501 UNLEADED PREMIUM GASOLINE w/7.7% ETHANOL
- 00545 TEXACO UNLEADED PREMIUM GASOLINE w/5.7% ETOH
- 00553 UNLEADED PREMIUM GASOLINE w/5.7% ETHANOL
- 01102 POWER PREMIUM 93 (RFG 2.0)
- 01105 POWER PREMIUM (RFG 2.0)
- 01113 POWER PREMIUM 93 (RFG 2.7) OXY
- 01114 POWER PREMIUM (RFG 2.7) OXY
- 01117 POWER PREMIUM 93 (RFG 2.0) OXY 7.2 RVP
- 01118 POWER PREMIUM (RFG 2.0) 7.2 RVP
- 01126 POWER PREMIUM 93 (RFG 2.0) 8.1 RVP
- 01127 POWER PREMIUM (RFG 2.0) 8.1 RVP
- 01133 UNLEADED PREMIUM GASOLINE 93 (RFG 2.0)
- 01134 UNLEADED PREMIUM GASOLINE (RFG 2.0)
- 01137 UNLEADED PREMIUM 93 GASOLINE (RFG 2.7) OXY
- 01138 UNLEADED PREMIUM GASOLINE (RFG 2.7) OXY
- 01142 UNLEADED PREMIUM GASOLINE 93 (RFG 2.0) 7.2 RVP
- 01143 UNLEADED PREMIUM GASOLINE (RFG 2.0) 7.2 RVP

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N.D. - NOT DETERMINED	N.A. - NOT APPLICABLE	N.T. - NOT TESTED
< - LESS THAN	> - GREATER THAN	



1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION (CONT)

- 01146 UNLEADED PREMIUM GASOLINE 93 (RFG 2.0) 8.1 RVP
- 01147 UNLEADED PREMIUM GASOLINE (RFG 2.0) 8.1 RVP
- 01150 TEXACO POWER PREMIUM (7.2 RVP)
- 01167 UNLEADED PREMIUM GASOLINE (7.2 RVP)
- 01190 TEXACO POWER PREMIUM (MIN 1.8 OXY)
- 01197 UNLEADED PREMIUM GASOLINE (MIN 1.8 OXY)
- 01249 UNLEADED PREMIUM RFG 2.0 OPRG NOT-VOC
- 01443 TEXACO POWER PREMIUM -- CG 7.0 RVP
- 01446 PREMIUM UNLEADED 93--CG 7.0 RVP
- 01447 UL PREMIUM 92 (NON-RFG)RVP 7.0 (BASE GASOLINE)
- 01451 UNLEADED PREMIUM 92 (NON-RFG) ADDITIZED RVP 7.0
- 02567 UL PREMIUM 93 RFG 2.0 RVP7.8 ADDITIZED VOC-REG1
- 02571 UNL PREM 93 RFG 2.0 RVP 8.3 ADDITIZED VOC-REG 2
- 02580 UNLEADED PREMIUM W/OXY ETOH10.0 (NON-RFG)ADDITIZED
- 02758 UNLEADED PREMIUM - CARB PHASE 2 RFG
- 02759 TEXACO POWER PREMIUM - CARB PHASE 2 RFG
- 02760 UNLEADED PREMIUM - CARB PHASE 2 RFG - ADDITIZED
- 07650 PREMIUM UNLEADED-RFG-AZ
- 07651 PREMIUM UNLEADED-RFG-AZ-ADDITIZED
- 07659 PREMIUM UNLEADED GASOLINE
- 07660 TEXACO POWER PREMIUM-OPRG-AZ-2.7% OXY
- 07661 TEXACO POWER PREMIUM-OPRG-AZ-3.5% OXY
- 07663 UNLEADED PREM-RBOB-AZ NOT VOC CONTROLLED-ANY OXY
- 07675 UNLEADED PREMIUM- CARB PHASE 2 RFG <1.5% OXY
- 07676 UNLEADED PREM CARB PHASE 2 RFG <1.5% OXY ADDITIZED
- 07685 PREMIUM UNLEADED --CG 9.0 RVP
- 07696 PREMIUM UNLEADED CONVENTIONAL GASOLINE 9.0 RVP

2. COMPOSITION/INFORMATION ON INGREDIENTS

THE CRITERIA FOR LISTING COMPONENTS IN THE COMPOSITION SECTION IS AS FOLLOWS: CARCINOGENS ARE LISTED WHEN PRESENT AT 0.1 % OR GREATER; COMPONENTS WHICH ARE OTHERWISE HAZARDOUS ACCORDING TO OSHA ARE LISTED WHEN PRESENT AT 1.0 % OR GREATER; NON-HAZARDOUS COMPONENTS ARE LISTED AT 3.0 % OR GREATER. THIS IS NOT INTENDED TO BE A COMPLETE COMPOSITIONAL DISCLOSURE. REFER TO SECTION 14 FOR APPLICABLE STATES' RIGHT TO KNOW AND OTHER REGULATORY INFORMATION.

Product and/or Component(s) Carcinogenic According to:

OSHA	IARC	NTP	OTHER	NONE
X	X	X	X	-

Composition: (Sequence Number and Chemical Name)

Seq.	Chemical Name	CAS Number	Range in %
Gasoline consists of straight/branched paraffinic hydrocarbons, olefins, cycloparaffins and aromatics. May or may not contain any combination of these oxygenates: MTBE, ETBE, TAME and/or EtOH in the range of 0-20%. Typical constituents (not intended as manufacturing specifications) include:			
01 *	Gasoline		95.00-99.99
02 *	Tert-amyl methyl ether	994-05-8	10.00-19.99
03 *	Ethyl-t-butyl ether	637-92-3	10.00-19.99
04 *	Methyl-t-butyl ether	1634-04-4	10.00-19.99
05 *	Ethyl alcohol	64-17-5	3.00-9.99
06 *	Xylenes	1330-20-7	3.00-9.99
07 *	Toluene	108-88-3	3.00-9.99
08 *	Benzene (if RFG, 0.99% max.)	71-43-2	1.00-2.99
09 *	1,2,4-trimethylbenzene	95-63-6	1.00-2.99
10 *	N-hexane	110-54-3	1.00-2.99
11 *	Ethylbenzene	100-41-4	1.00-2.99

PRDDUCT IS HAZARDOUS ACCORDING TO OSHA (1910.1200).

* COMPONENT IS HAZARDOUS ACCORDING TO OSHA.

Exposure Limits referenced by Sequence Number in the Composition Section

Seq.	Limit
01	300 ppm TWA-OSHA
01	500 ppm STEL-OSHA
01	300 ppm TWA-ACGIH
01	100 ppm TWA-TEXACO
04	40 ppm TWA-ACGIH (A3)
04	40 ppm TWA-TEXACO
05	1000 ppm TWA-OSHA
05	1000 ppm TWA-ACGIH-(A4)

PAGE: 2

N.D. - NOT DETERMINED N.A. - NOT APPLICABLE N.T. - NOT TESTED
 < - LESS THAN > - GREATER THAN



2. COMPOSITION/INFORMATION ON INGREDIENTS (CONT)

06	100	ppm TWA-OSHA
06	150	ppm STEL-OSHA
06	100	ppm TWA-ACGIH-(A4)
06	150	ppm STEL-ACGIH-(A4)
07	100	ppm TWA-OSHA
07	150	ppm STEL-OSHA
07	50	ppm TWA-ACGIH (SKIN) (A4)
08	1	ppm TWA-OSHA (SUBJECT TO 29 CFR 1910.1028)
08	5	ppm STEL-OSHA
08	0.5	ppm TWA-ACGIH (SKIN) (A1)
08	2.5	ppm STEL-ACGIH
09	25	ppm TWA-OSHA
09	25	ppm TWA-ACGIH
10	50	ppm TWA-OSHA
10	50	ppm TWA-ACGIH
11	100	ppm TWA-OSHA
11	125	ppm STEL-OSHA
11	100	ppm TWA-ACGIH
11	125	ppm STEL-ACGIH

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW

Appearance:
Light red to light straw liquid
Odor:
Petroleum odor

WARNING STATEMENT

DANGER ! EXTREMELY FLAMMABLE LIQUID AND VAPOR
VAPOR MAY CAUSE FLASH FIRE
MAY CAUSE DIZZINESS AND DROWSINESS
MAY CAUSE EYE IRRITATION
ASPIRATION HAZARD IF SWALLOWED -
CAN ENTER LUNGS AND CAUSE DAMAGE
ATTENTION ! POSSIBLE CANCER HAZARD - MAY CAUSE CANCER BASED ON ANIMAL
DATA

HMIS

Health: 1 Reactivity: 0
Flammability: 3 Special : -

NFPA

Health: 1 Reactivity: 0
Flammability: 3 Special : -

POTENTIAL HEALTH EFFECTS

	EYE	SKIN	INHALATION	INGESTION
Primary Route of Exposure:	X	X	X	-

EFFECTS OF OVEREXPOSURE

Acute:

Eyes:

May cause irritation, experienced as mild discomfort and seen as slight excess redness of the eye.

Skin:

Brief contact may cause slight irritation. Prolonged contact, as with clothing wetted with material, may cause more severe irritation and discomfort, seen as local redness and swelling.

Other than the potential skin irritation effects noted above, acute (short term) adverse effects are not expected from brief skin contact; see other effects, below, and Section 11 for information regarding potential long term effects.

Prolonged, widespread, or repeated skin contact may result in the absorption of potentially harmful amounts of material.



3. HAZARD IDENTIFICATION (CONT)

Inhalation:

Vapors or mist may cause irritation of the nose and throat.

Inhalation may cause dizziness, drowsiness, euphoria, loss of coordination, disorientation, headache, nausea, and vomiting. In poorly ventilated areas or confined spaces, unconsciousness and asphyxiation may result. Prolonged or repeated overexposure may result in the absorption of potentially harmful amounts of material.

Ingestion:

If more than several mouthfuls are swallowed, abdominal discomfort, nausea, and diarrhea may occur. Aspiration may occur during swallowing or vomiting resulting in lung damage.

Sensitization Properties:

Unknown.

Chronic:

Prolonged and repeated exposure to ethanol vapor may cause headache, lack of coordination, sleepiness, fatigue, and difficulty concentrating. Chronic ingestion of alcoholic beverages has resulted in liver, stomach, heart and nervous system damage as well as cancers of the mouth, pharynx, larynx, esophagus, and liver in humans. Repeated ingestion of ethanol by pregnant women has caused miscarriage, premature birth and low birth weight, and birth defects (Fetal Alcohol Syndrome).

Medical Conditions Aggravated by Exposure:

Because of its irritating properties, repeated skin contact may aggravate an existing dermatitis (skin condition).

Other Remarks:

This product contains benzene. Prolonged and repeated exposure to benzene may cause headaches, loss of appetite, rapid pulse, fatigue, liver and kidney damage, decreased bone-marrow activity with increased bleeding tendencies, and possible irreversible injury to blood forming organs. Prolonged and repeated overexposure to benzene has been associated with aplastic anemia and acute myelogenous leukemia in humans.

4. FIRST AID MEASURES

Eyes:

Immediately flush eyes with plenty of water for at least 15 minutes. Hold eyelids apart while flushing to rinse entire surface of eye and lids with water. Get medical attention.

Skin:

Wash skin with plenty of soap and water for several minutes. Get medical attention if skin irritation develops or persists.

Ingestion:

If person is conscious and can swallow, give two glasses of water (16 oz.) but do not induce vomiting. If vomiting occurs, give fluids again. Have medical personnel determine if evacuation of stomach or induction of vomiting is necessary. Do not give anything by mouth to an unconscious or convulsing person.

Inhalation:

If inhaled, remove to fresh air. If not breathing or in respiratory distress, clear person's airway and start artificial respiration. With a physician's advice, give supplemental oxygen using a bag-valve mask or manually triggered oxygen supply.



4. FIRST AID MEASURES (CONT)

Other Instructions:

Aspiration of this product during induced emesis may result in severe lung injury. If evacuation of stomach is necessary, use method least likely to cause aspiration, such as gastric lavage after endotracheal intubation. Contact a Poison Center for additional treatment information.

Remove and dry-clean or launder clothing soaked or soiled with this material before reuse. Dry cleaning of contaminated clothing may be more effective than normal laundering. Inform individuals responsible for cleaning of potential hazards associated with handling contaminated clothing.

5. FIRE-FIGHTING MEASURES

Ignition Temperature - AIT (degrees F):

850

Flash Point (degrees F):

-40 (PMCC)

Flammable Limits (%):

Lower: 1.4

Upper: 7.6

Recommended Fire Extinguishing Agents And Special Procedures:

Water may be ineffective on flames but should be used to cool fire-exposed containers and provide protection for persons attempting to stop the leak. Use water spray, dry chemical, alcohol resistant foam or carbon dioxide to extinguish fire.

Unusual or Explosive Hazards:

Gasoline vapors are heavier than air and may travel a considerable distance to a source of ignition and flash back. Flowing gasoline can generate static electricity and cause a fire explosion if a spark occurs in a flammable vapor-air atmosphere. When handling, use non-sparking tools, ground and bond all containers.

Extremely flammable, can be ignited by heat, spark, or flame.

Special Protective Equipment for Firefighters:

Wear full protective clothing and positive pressure breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES (Transportation Spills: CHEMTREC (800)424-9300)

Procedures in Case of Accidental Release, Breakage or Leakage:

Eliminate all ignition sources including internal combustion engines and power tools. Ventilate area. Barricade the immediate hazard area. Stay upwind and warn of possible downwind explosion hazard. Avoid breathing vapor. Avoid contact with skin, eyes, or clothing. Pressure demand air supplied respirators should always be worn when the airborne concentration of the contaminant or oxygen is unknown. Otherwise, wear respiratory protection and other personal protective equipment as appropriate for the potential exposure hazard. Contain spill if possible. Remove with inert absorbent. Prevent entry into sewers and waterways.

If more than 714 pounds of product is spilled, then report spill according to SARA 304 and/or CERCLA 102(a) requirements, unless product qualifies for the petroleum exemption (CERCLA Section 101(14)).

7. HANDLING AND STORAGE

Precautions to be Taken in

Handling:

Use spark-proof tools. Material may be at elevated temperatures and/or pressures. Exercise care when opening bleeders and sampling ports.

Storage:

Ground and bond shipping container, transfer line, and receiving container. Keep away from heat, sparks, flame, and other sources of ignition.

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N.D. - NOT DETERMINED
< - LESS THAN

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N.T. - NOT TESTED



8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Protective Equipment (Type)

Eye/Face Protection:

Safety glasses, chemical type goggles, or face shield recommended to prevent eye contact.

Skin Protection:

Gloves resistant to petroleum distillates are recommended to minimize skin contact. The most effective glove materials are Nitrile rubber, Teflon, or Viton for prolonged contact with gasoline. Protective clothing such as coveralls or boots should be also be worn where contact with product is likely. Launder or dry clean soiled clothes.

Respiratory Protection:

Airborne concentrations should be kept to lowest levels possible. If vapor, mist or dust is generated and the occupational exposure limit of the product, or any component of the product, is exceeded, use appropriate NIOSH or MSHA approved air purifying or air supplied respirator after determining the airborne concentration of the contaminant. Air supplied respirators should always be worn when airborne concentration of the contaminant or oxygen content is unknown.

Ventilation:

Use explosion-proof equipment to maintain adequate ventilation to meet occupational exposure limits, if applicable (see below), prevent accumulation of explosive air-gas mixtures, and avoid significant oxygen displacement. Oxygen levels should be at least 19.5% in confined spaces or other work areas (OSHA value).

Exposure Limit for Total Product:

Gasoline: OSHA PEL-TWA 300 ppm; STEL 500 ppm.
ACGIH TLV-TWA 300 ppm; STEL 500 ppm.
TEXACO TLV-TWA 100 ppm.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:

Light red to light straw liquid

Odor:

Petroleum odor

Boiling Point (degrees F):

> 90

Melting/Freezing point (degrees F):

Not applicable.

Specific Gravity (water=1):

.7 - .77

pH of undiluted product:

Not applicable.

Vapor Pressure:

300 - 700 mmHg at 100.0

Viscosity:

< 1.4 cSt at 37.7 C

VOC Content:

Not determined.

Vapor Density (air=1):

3 - 4

Solubility in Water (%):

.1 - 1

Other: None

PRODUCT CODE: 26020
NAME: UNLEADED PREMIUM GASOLINE

Date Issued: 1998-05-05
Supersedes: 1998-03-03



10. STABILITY AND REACTIVITY

This Material Reacts Violently With:

(If Others is checked below, see comments for details)

Air	Water	Heat	Strong Oxidizers	Others	None of These
-	-	X	X	-	-

Comments:
None

Products Evolved When Subjected to Heat or Combustion:

Toxic levels of carbon monoxide, carbon dioxide, irritating aldehydes and ketones.

Hazardous Polymerizations: DO NOT OCCUR

11. TOXICOLOGICAL INFORMATION

TOXICOLOGICAL INFORMATION (ANIMAL TOXICITY DATA)

Median Lethal Dose

Oral:

LD50 Believed to be > 5.00 g/kg (rat) practically non-toxic

Inhalation:

Not determined.

Dermal:

LD50 Believed to be > 2.00 g/kg (rabbit) practically non-toxic

Irritation Index, Estimation of Irritation (Species)

Skin:

(Draize) Believed to be > .50 - 3.00 /8.0 (rabbit) slightly irritating

Eyes:

(Draize) Believed to be > 15.00 - 25.00 /110 (rabbit) slightly irritating

Sensitization:

Not determined.

Other:

Studies in laboratory rats and mice exposed to constant levels of wholly vaporized unleaded gasoline for six hours per day, five days per week for two years caused kidney damage and kidney cancer in male rats and liver tumors in female mice. Many scientists do not believe that the male rat is an appropriate predictor of human kidney disease and are not in agreement on the relationship between liver tumors in laboratory animals and humans.

An inhalation developmental study conducted in rats with unleaded gasoline showed no evidence of maternal toxicity or developmental effects at exposure levels up to 9000 ppm.

Prolonged and repeated exposure to benzene has caused anemia, lymphoma, and other cancers, in laboratory animals. Benzene has been shown to cause embryo/fetal toxicity and birth defects in laboratory animals, but only at doses which cause maternal toxicity (i.e., illness in the mother).

Chronic ingestion of ethanol, a possible component of this product, has caused birth defects as well as developmental effects in laboratory animals.

In male mice, prolonged and repeated exposure to high levels of MTBE vapor produced a higher than expected mortality due to urinary tract obstruction believed caused by physical non-neoplastic blockage of the urethral canal. In female mice, data indicate increased incidence of hepatocellular adenomas (benign liver tumors).

Prolonged and repeated exposure to high levels of MTBE (up to 8000 ppm for over 15 months) resulted in excess mortality (82 %) in male rats. Preliminary evaluation showed a chronic progressive nephrosis (kidney damage) as the possible cause of death.

Associated with the increased severity of nephropathy was an increase in the number of renal tubular cell adenomas (benign kidney tumors) and carcinomas (malignant kidney tumors). There was also a difference in the number of testicular interstitial cell adenomas (benign testicular tumors). MTBE has been shown to cause embryo/fetal toxicity and birth defects in mice, but only at maternally toxic doses. No developmental effects were seen in rabbits at the same exposure levels. Although the significance of these findings to humans is unclear, workers should minimize exposure to MTBE vapor.

Prolonged and repeated exposure of rats to high levels of TAME vapor

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N.D. - NOT DETERMINED
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11. TOXICOLOGICAL INFORMATION (CONT)

resulted in 25% mortality at the highest dose level and produced transient CNS depression (sedation, incoordination, reduced activity). Body and organ weight changes were observed without underlying tissue pathology (i.e. changes to the tissue). A repeated oral study with TAME in rats resulted in two deaths in the high dose group. There were no treatment related tissue changes in any of the organ systems evaluated although there were body and organ weight changes. TAME was judged to produce an overall low order of toxicity.

In a range finding developmental study, cleft palate was observed in offspring of mice exposed to 4000 ppm. This exposure level caused profound maternal toxicity. At 1000 ppm there were no signs of maternal toxicity or developmental effects in mice. No malformations were observed in offspring of rats exposed up to 4000 ppm. A definitive study is currently under way in both species.

Results of an in vitro study of chromosome aberrations in Chinese Hamster Ovary Cells (CHO) indicated a positive response with metabolic activation. A repeat study confirmed the results of the original study, and indicated a positive response without metabolic activation. In the repeat study, more cytotoxicity was present in the non-activated system and may be the cause of the positive findings. TAME did not demonstrate any evidence of genotoxic activity in the Ames bacterial test, the CHO HGPRT gene mutation test, or the in vivo mouse micronucleus test. Therefore, the majority of the data appears to indicate that TAME does not have mutagenic potential.

Inhalation exposure of mice and rats to 0, 250, 1500, or 3500 ppm TAME resulted in developmental effects in mice at the mid and high dose levels and in rats at the high dose level. Maternal toxicity was seen in both species at the mid and high dose levels.

12. DISPOSAL CONSIDERATIONS

Waste Disposal Methods

This product (as presently constituted) has the RCRA classification of benzene toxicity and ignitability. If discarded in its present form, it would have the hazardous waste numbers D018 and D001 respectively. Under RCRA, it is the responsibility of the user of the product to determine, at the time of disposal, whether the product meets RCRA criteria for hazardous waste. This is because product uses, transformations, mixtures, processes, etc. may change the classification to non-hazardous, or hazardous for reasons other than, or in addition to benzene toxicity and ignitability.

Remarks

Do not allow to enter drains or sewers. Can cause explosion.

13. TRANSPORT INFORMATION

Transportation

DOT:

Proper Shipping Name:

Gasoline

Hazard Class:

3

Identification Number: UN1203

Packing Group: II

Label Required:

Flammable liquid

Marine pollutant:

Not applicable

This product contains a DOT Hazardous Substance or Substances, listed in Section 14 of the MSDS. If the product's shipping container holds at least 714 lbs, then the DOT information must be accompanied with RQ notation, or, an otherwise 'Not Regulated' product will be classified as Environmentally Hazardous (solid/liquid) N.O.S., Class 9, unless the product qualifies for the petroleum exemption (49 CFR 171.8).

IMDG:

Proper Shipping Name:

Not evaluated

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N.D. - NOT DETERMINED
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13. TRANSPORT INFORMATION (CONT)

ICAO:

Proper Shipping Name:
 Not evaluated

TDG:

Proper Shipping Name:
 Not evaluated

14. REGULATORY INFORMATION

Federal Regulations:

SARA Title III:

Section 302/304 Extremely Hazardous Substances

Seq.	Chemical Name	CAS Number	Range in %
None			

None

Section 302/304 Extremely Hazardous Substances (CONT)

Seq.	TPQ	RQ
None		

None

Section 311 Hazardous Categorization:

Acute	Chronic	Fire	Pressure	Reactive	N/A
X	X	X	-	-	-

Section 313 Toxic Chemical

Chemical Name	CAS Number	Concentration
Methyl-t-butyl ether	1634-04-4	10.00-19.99
Xylenes	1330-20-7	3.00-9.99
Toluene	108-88-3	3.00-9.99
Benzene (if RFG, 0.99% max.)	71-43-2	1.00-2.99
1,2,4-trimethylbenzene	95-63-6	1.00-2.99
N-hexane	110-54-3	1.00-2.99
Ethylbenzene	100-41-4	1.00-2.99

CERCLA 102(a)/DOT Hazardous Substances: (+ indicates DOT Hazardous Substance)

Seq.	Chemical Name	CAS Number	Range in %
01+	Methyl-t-butyl ether	1634-04-4	10.00-19.99
02+	Xylenes	1330-20-7	3.00-9.99
03+	Toluene	108-88-3	3.00-9.99
04+	Benzene (if RFG, 0.99% max.)	71-43-2	1.00-2.99
05+	Ethylbenzene	100-41-4	1.00-2.99
06+	N-hexane	110-54-3	1.00-2.99
07+	Benzene, (1-methylethyl) -	98-82-8	0.01-0.09

CERCLA/DOT Hazardous Substances (Sequence Numbers and RQ's):

Seq.	RQ
01+	1000
02+	100
03+	1000
04+	10
05+	1000
06+	5000
07+	5000

TSCA Inventory Status:

This product, or its components, are listed on or are exempt from the Toxic Substance Control Act (TSCA) Chemical Substance Inventory.

Other:

None.

State Regulations:

California Proposition 65:

The following detectable components of this product are substances, or belong to classes of substances, known to the State of California to cause cancer and/or reproductive toxicity.

Chemical Name	CAS Number
Gasoline	
Toluene	108-88-3
Benzene (if RFG, 0.99% max.)	71-43-2



PRODUCT CODE: 26020
NAME: UNLEADED PREMIUM GASOLINE

Date Issued: 1998-05-05
Supersedes: 1998-03-03

14. REGULATORY INFORMATION (CONT)

International Regulations:

Export Notification (TSCA-12b):

This product may be subject to export notification under TSCA section 12(b); contains:
Methyl-t-butyl ether
Tert-amyl methyl ether

WHMIS Classification:

Not determined

Canada Inventory Status:

Not determined.

EINECS Inventory Status:

Not determined.

Australia Inventory Status:

Not determined.

Japan Inventory Status:

Not determined.

15. ENVIRONMENTAL INFORMATION

Aquatic Toxicity:

Not determined.

Mobility:

Not determined.

Persistence and Biodegradability:

Not determined.

Potential to Bioaccumulate:

Not determined.

Remarks:

None

16. OTHER INFORMATION

THIS PRODUCT IS INTENDED FOR USE AS A MOTOR FUEL ONLY.

Texaco recommends that all exposures to this product be minimized by strictly adhering to recommended occupational controls procedures to avoid any potential adverse health effects.

Texaco has notified EPA of a TSCA 8(e) Notice of Substantial Risk to Health on the basis of results from a range finding developmental toxicity study for this product or a component of this product.
A definitive developmental toxicity study is underway.

THE INFORMATION CONTAINED HEREIN IS BELIEVED TO BE ACCURATE. IT IS PROVIDED INDEPENDENTLY OF ANY SALE OF THE PRODUCT FOR PURPOSE OF HAZARD COMMUNICATION AS PART OF TEXACO'S PRODUCT SAFETY PROGRAM. IT IS NOT INTENDED TO CONSTITUTE PERFORMANCE INFORMATION CONCERNING THE PRODUCT. NO EXPRESS WARRANTY, OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS MADE WITH RESPECT TO THE PRODUCT OR THE INFORMATION CONTAINED HEREIN. DATA SHEETS ARE AVAILABLE FOR ALL TEXACO PRODUCTS. YOU ARE URGED TO OBTAIN DATA SHEETS FOR ALL TEXACO PRODUCTS YOU BUY, PROCESS, USE OR DISTRIBUTE AND YOU ARE ENCOURAGED AND REQUESTED TO ADVISE THOSE WHO MAY COME IN CONTACT WITH SUCH PRODUCTS OF THE INFORMATION CONTAINED HEREIN.

TO DETERMINE APPLICABILITY OR EFFECT OF ANY LAW OR REGULATION WITH RESPECT TO THE PRODUCT, USER SHOULD CONSULT HIS LEGAL ADVISOR OR THE APPROPRIATE GOVERNMENT AGENCY. TEXACO DOES NOT UNDERTAKE TO FURNISH ADVICE ON SUCH MATTERS.

Date: 1998-05-05 New Revised, Supersedes: 1998-03-03
Date printed: 1998-07-08

PAGE: 10

N.D. - NOT DETERMINED
< - LESS THAN

N.A. - NOT APPLICABLE
> - GREATER THAN

N.T. - NOT TESTED

PRODUCT CODE: 26020
NAME: UNLEADED PREMIUM GASOLINE

Date Issued: 1998-05-05
Supersedes: 1998-03-03



16. OTHER INFORMATION (CONT)

Inquiries regarding MSDS should be directed to:
Texaco Inc.
Manager, Product Safety
P.O. Box 509
Beacon, N.Y. 12508

PLEASE SEE NEXT PAGE FOR PRODUCT LABEL

PAGE: 11

N.D. - NOT DETERMINED
< - LESS THAN

N.A. - NOT APPLICABLE
> - GREATER THAN

N.T. - NOT TESTED

PRODUCT CODE: 26020
NAME: UNLEADED PREMIUM GASOLINE

Date Issued: 1998-05-05
Supersedes: 1998-03-03



17. PRODUCT LABEL

Label Date: 1997-05-19

READ AND UNDERSTAND MATERIAL SAFETY DATA SHEET BEFORE HANDLING OR DISPOSING OF PRODUCT. THIS LABEL COMPLIES WITH THE REQUIREMENTS OF THE OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200) FOR USE IN THE WORKPLACE. THIS LABEL IS NOT INTENDED TO BE USED WITH PACKAGING INTENDED FOR SALE TO CONSUMERS AND MAY NOT CONFORM WITH THE REQUIREMENTS OF THE CONSUMER PRODUCT SAFETY ACT OR OTHER RELATED REGULATORY REQUIREMENTS.

26020 UNLEADED PREMIUM GASOLINE

WARNING STATEMENT

DANGER ! EXTREMELY FLAMMABLE LIQUID AND VAPOR
VAPOR MAY CAUSE FLASH FIRE
MAY CAUSE DIZZINESS AND DROWSINESS
MAY CAUSE EYE IRRITATION
ASPIRATION HAZARD IF SWALLOWED -
CAN ENTER LUNGS AND CAUSE DAMAGE

ATTENTION ! POSSIBLE CANCER HAZARD - MAY CAUSE CANCER BASED ON ANIMAL DATA

PRECAUTIONARY MEASURES

- Keep away from heat, sparks or flame.
- Use only with adequate ventilation.
- Avoid breathing vapor, mist, or gas.
- Avoid contact with eyes, skin, and clothing.
- Keep container closed.
- Never siphon by mouth.
- Wash thoroughly after handling.

FIRST AID

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes. Hold eyelids apart while flushing to rinse entire surface of eye and lids with water. Get medical attention.

Skin Contact:

Wash skin with plenty of soap and water for several minutes. Get medical attention if skin irritation develops or persists.

Ingestion:

If person is conscious and can swallow, give two glasses of water (16 oz.) but do not induce vomiting. If vomiting occurs, give fluids again. Have medical personnel determine if evacuation of stomach or induction of vomiting is necessary. Do not give anything by mouth to an unconscious or convulsing person.

Inhalation:

If inhaled, remove to fresh air. If not breathing or in respiratory distress, clear person's airway and start artificial respiration. With a physician's advice, give supplemental oxygen using a bag-valve mask or manually triggered oxygen supply.

Note to Physician:

Aspiration of this product during induced emesis may result in severe lung injury. If evacuation of stomach is necessary, use method least likely to cause aspiration, such as gastric lavage after endotracheal intubation. Contact a Poison Center for additional treatment information.

FIRE

In case of fire, use water spray, dry chemical, alcohol resistant foam, or carbon dioxide. Water may be ineffective on flames. Use water spray to keep containers cool and protect personnel attempting to stop the leak.

If more than 714 pounds of product is spilled, then report spill according to SARA 304 and/or CERCLA 102(a) requirements, unless product qualifies for the petroleum exemption (CERCLA Section 101(14)).

Chemical Name	CAS Number	Range in %
Gasoline consists of straight/branched paraffinic hydrocarbons, olefins, cycloparaffins and aromatics. May or may not contain any combination of these oxygenates: MTBE, ETBE, TAME and/or EtOH in the range of 0-20%. Typical constituents (not intended as manufacturing specifications) include:		



PRODUCT CODE: 26020 Date Issued: 1998-05-05
 NAME: UNLEADED PREMIUM GASOLINE Supersedes: 1998-03-03

17. PRODUCT LABEL (CONT) Label Date: 1997-05-19

			95.00-99.99
*	Gasoline	1634-04-4	10.00-19.99
*	Methyl-t-butyl ether	637-92-3	10.00-19.99
*	Ethyl-t-butyl ether	994-05-8	10.00-19.99
*	Tert-amyl methyl ether	64-17-5	3.00-9.99
*	Ethyl alcohol	1330-20-7	3.00-9.99
*	Xylenes	108-88-3	3.00-9.99
*	Toluene	71-43-2	1.00-2.99
*	Benzene (if RFG, 0.99% max.)	95-63-6	1.00-2.99
*	1,2,4-trimethylbenzene	100-41-4	1.00-2.99
*	Ethylbenzene	110-54-3	1.00-2.99
*	N-hexane		

PRODUCT IS HAZARDOUS ACCORDING TO OSHA (1910.1200).
 * COMPONENT IS HAZARDOUS ACCORDING TO OSHA.

<u>Pennsylvania Special Hazardous Substance(s)</u>	<u>CAS Number</u>	<u>Range in %</u>
Benzene (if RFG, 0.99% max.)	71-43-2	1.00-2.99

HMIS		NFPA	
Health: 1	Reactivity: 0	Health: 1	Reactivity: 0
Flammability: 3	Special: -	Flammability: 3	Special: -

Transportation

DOT:

Proper Shipping Name:

Gasoline

Hazard Class:

3

Identification Number: UN1203

Packing Group: II

Label Required:

Flammable liquid

Marine pollutant:

Not applicable

This product contains a DOT Hazardous Substance or Substances, listed in Section 14 of the MSDS. If the product's shipping container holds at least 714 lbs, then the DOT information must be accompanied with RQ notation, or, an otherwise 'Not Regulated' product will be classified as Environmentally Hazardous (solid/liquid) N.O.S., Class 9, unless the product qualifies for the petroleum exemption (49 CFR 171.8).

CAUTION: Misuse of empty containers can be hazardous. Empty containers can be hazardous if used to store toxic, flammable, or reactive materials. Cutting or welding of empty containers might cause fire, explosion or toxic fumes from residues. Do not pressurize or expose to open flame or heat. Keep container closed and drum bungs in place.

Manufacturer's Name and Address:
 TEXACO REFINING AND MARKETING, INC
 P.O. Box 7812
 Universal City, CA 91608

TRANSPORTATION EMERGENCY Company: (914) 831-3400
 CHEMTREC: (800) 424-9300

HEALTH EMERGENCY Company: (914) 831-3400



MATERIAL SAFETY
DATA SHEET

AMOCO REGULAR LEAD-FREE GASOLINE

MSDS NO: 02003992

MANUFACTURER/SUPPLIER:
Amoco Oil Company
200 East Randolph Drive
Chicago, Illinois 60601

EMERGENCY HEALTH INFORMATION: (800) 447-8735
EMERGENCY SPILL INFORMATION: (800) 424-9300
CHEMTREC, U.S.A.
OTHER PRODUCT SAFETY INFORMATION: (312) 856-3907

IMPORTANT COMPONENTS: Gasoline (CAS 8006-61-9) ACGIH TLV 300 ppm, STEL 500 ppm;
OSHA PEL 300 ppm, STEL 500 ppm.
Benzene (CAS 71-43-2) ACGIH TLV 10 ppm; OSHA PEL 1 ppm
(8-hr. TWA), STEL 5 ppm (15 min.).
*See Supplemental Information Section.

WARNING STATEMENT: Danger! Extremely flammable. High vapor concentrations can cause headaches, dizziness, drowsiness and nausea. Harmful if swallowed and/or aspirated into lungs. Can produce skin irritation on prolonged or repeated contact. Use as motor fuel only. Long-term exposure to vapors has caused cancer in laboratory animals.

HMIS/NFPA CODES: (HEALTH;1)(FLAMMABILITY;3)(REACTIVITY;0), Chronic health hazard

APPEARANCE AND ODOR: Clear, bright liquid. Characteristic odor.

HEALTH HAZARD INFORMATION

EYE

EFFECT: High concentrations of vapor/mist may cause eye discomfort.

FIRST AID: Flush eyes with plenty of water. Get medical attention if irritation persists.

PROTECTION: None required; however, use of eye protection is good industrial practice.

SKIN

EFFECT: Prolonged or repeated contact can defat the skin and lead to irritation and/or dermatitis.

FIRST AID: Wash exposed skin with soap and water. Remove contaminated clothing, including shoes, and thoroughly clean and dry before reuse. Get medical attention if irritation develops.

PROTECTION: Avoid prolonged or repeated skin contact. Wear protective clothing and gloves if prolonged or repeated contact is likely.

INHALATION

EFFECT: Vapour harmful. High vapor concentrations can cause headaches, dizziness, drowsiness and nausea. See Toxicology Section.

FIRST AID: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get medical attention.

PROTECTION: Use with adequate ventilation. Avoid breathing vapor and/or mist. If ventilation is inadequate, use NIOSH/MSHA certified respirator which will protect against organic vapor/mist.

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HEALTH HAZARD INFORMATION - CONTINUED

INGESTION

EFFECT: Low viscosity product. Harmful or fatal if aspirated into lungs.

FIRST AID: If swallowed, do NOT induce vomiting. Get immediate medical attention.

FIRE AND EXPLOSION INFORMATION

FLASHPOINT: -45°F

FLAMMABLE LIMITS: UPPER: 7.6% LOWER: 1.3%

AUTOIGNITION TEMPERATURE: 495°F

EXTINGUISHING MEDIA: Agents approved for Class B hazards (e.g., dry chemical, carbon dioxide, halogenated agents, foam, steam) or water fog.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Extremely flammable vapor/air mixtures form. Extinguishment of fire before source of vapor is shut off can create an explosive mixture in air.

PRECAUTIONS: Keep away from ignition sources (e.g., heat, sparks and open flames). Keep container closed. Use with adequate ventilation.

REACTIVITY INFORMATION

DANGEROUS REACTIONS: Avoid chlorine, fluorine and other strong oxidizers.

HAZARDOUS DECOMPOSITION: Burning can produce carbon monoxide and/or carbon dioxide and other harmful products.

STABILITY: Burning can be started easily.

CHEMICAL AND PHYSICAL PROPERTIES

BOILING POINT: 80°F TO 430°F, Range

SOLUBILITY IN WATER: Negligible, below 0.1%.

SPECIFIC GRAVITY (WATER = 1): 0.75

VAPOR PRESSURE: 7-15 lb RVP (ASTM D-323)

VAPOR DENSITY (AIR = 1): 3 TO 4

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STORAGE AND ENVIRONMENTAL PROTECTION

STORAGE REQUIREMENTS: Store in flammable liquids storage area. Keep container closed. Store away from heat, ignition sources, and open flame in accordance with applicable federal, state, or local regulations.

SPILLS AND LEAKS: Remove or shut off all sources of ignition. Use water spray to disperse vapors. Increase ventilation, if possible. Contain on an absorbent material (e.g., sand, sawdust, dirt, clay). Keep out of sewers and waterways.

WASTE DISPOSAL: Residues and spilled material are hazardous waste due to ignitability. Disposal must be in accordance with applicable federal, state, or local regulations. Enclosed-controlled incineration is recommended unless directed otherwise by applicable ordinances.

SPECIAL PRECAUTIONS: Keep out of sewers and waterways. Avoid strong oxidizers. Report spills to appropriate authorities. USE AS MOTOR FUEL ONLY.

TOXICOLOGICAL INFORMATION

EYE: Primary eye irritation score 0.0/110.0 (rabbits).

SKIN: Primary dermal irritation score 1.1/8.0 (rabbits). Acute dermal LD50 greater than 5ml/kg (rabbits). Practically nontoxic for acute exposures by this route.

INHALATION: Acute LC50 20.7mg/l (rats).

INGESTION: Acute oral LD50 18.8ml/kg (rats). Practically nontoxic for acute exposures by this route.

Excessive exposure to vapors may produce headaches, dizziness, nausea, drowsiness, irritation of eyes, nose and throat and central nervous system depression.

In a long-term inhalation study of whole unleaded gasoline vapors, exposure-related kidney damage and kidney tumors were observed in male rats. Similar kidney effects were not seen in female rats or in mice. At the highest exposure level (2056 ppm), female mice had an increased incidence of liver tumors. Results from subsequent scientific studies suggest that the kidney damage and probably the kidney tumor response are unique to the male rat. The significance of the mouse liver tumor response in terms of human health is questionable.

Inhalation of whole unleaded gasoline vapors did not produce birth defects in laboratory animals.

Gasoline is a complex mixture of hydrocarbons and contains benzene (up to 4 volume %), toluene and xylene. Chronic exposure to high levels of benzene has been shown to cause cancer (leukemia) in humans and other adverse blood effects (anemia). Benzene is considered a human carcinogen by IARC, NTP and OSHA. Overexposure to xylene and toluene can cause irritation to the upper respiratory tract, headache and narcosis. Some liver damage and lung inflammation were seen in chronic studies on xylene in guinea pigs but not in rats.

Aspiration of this product into the lungs can cause chemical pneumonia and can be fatal. Aspiration into the lungs can occur while vomiting after ingestion of this product.

REGULATORY INFORMATION

CERCLA REPORTABLE QUANTITY:

This product is exempt from the CERCLA reporting requirements under 40 CFR Part 302.4. However, if spilled into waters of the United States, it may be reportable under 40 CFR Part 153 if it produces a sheen.

DOT PROPER SHIPPING NAME: Gasoline, Flammable Liquid, UN1203.

OSHA HAZARD COMMUNICATION STANDARD: Flammable liquid. Irritant. Contains components listed by ACGIH. Contains components listed by OSHA. Contains a carcinogenic component.

RCRA STATUS:

This product is subject to the 40 CFR Part 268.30 land ban on the disposal of certain hazardous wastes because it contains the following substance(s):

COMPONENT/CAS NUMBER

Ethylbenzene (100-41-4)
Toluene (108-88-3)
Xylene (1330-20-7)

SARA STATUS:

This product is regulated under the following section(s) of SARA Title III, 42 USC 9601. Spills or releases of the product may be reportable as determined by the information given below:

SECTIONS 311 AND 312 OF SARA AND 40 CFR PART 370:
This product is defined as hazardous by OSHA under 29 CFR Part 1910.1200(d).

SECTION 313 OF SARA AND 40 CFR PART 372:
This product contains the following substances, which are on the Toxic Chemicals List in 40 CFR Part 372:

COMPONENT/CAS NUMBER	WEIGHT PERCENT
Benzene (71-43-2)	4
Ethylbenzene (100-41-4)	2
Toluene (108-88-3)	22
Cyclohexane (110-82-7)	5
Xylene (1330-20-7)	10
MTBE (1634-04-4)	7

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

SUPPLEMENTAL INFORMATION

Gasoline is a complex mixture of hydrocarbons. Those major components having occupational exposure limits are:

Butane (CAS 106-97-8) ACGIH TLV 800 ppm; OSHA PEL 800 ppm.

Cyclohexane (CAS 110-82-7) ACGIH TLV 300 ppm; OSHA PEL 300 ppm.

Ethylbenzene (CAS 100-41-4) ACGIH TLV 100 ppm, STEL 125 ppm;
OSHA PEL 100 ppm, STEL 125 ppm.

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SUPPLEMENTAL INFORMATION - CONTINUED

n-Heptane (CAS 142-82-5) ACGIH TLV 400 ppm, STEL 500 ppm;
OSHA PEL 400 ppm, STEL 500 ppm.

n-Hexane (CAS 110-54-3) ACGIH TLV 50 ppm; OSHA PEL 50 ppm.

Pentane (CAS 109-66-0) ACGIH TLV 600 ppm, STEL 750 ppm;
OSHA PEL 600 ppm, STEL 750 ppm.

Toluene (CAS 108-88-3) ACGIH TLV 100 ppm, STEL 150 ppm;
OSHA PEL 100 ppm, STEL 150 ppm.

Trimethyl benzene (CAS 25551-13-7) ACGIH TLV 25 ppm; OSHA PEL 25 ppm.

Xylene (CAS 1330-20-7) ACGIH TLV 100 ppm, STEL 150 ppm;
OSHA PEL 100 ppm, STEL 150 ppm.

ISSUE INFORMATION

BY:



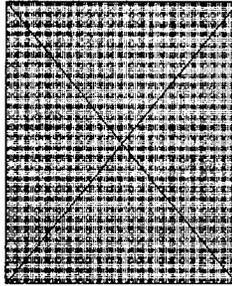
R. G. Farmer, Director,
Product Safety & Toxicology

ISSUED: June 09, 1989
SUPERSEDES: March 18, 1988

This material safety data sheet and the information it contains is offered to you in good faith as accurate. We have reviewed any information contained in this data sheet which we received from sources outside our company. We believe that information to be correct but cannot guarantee its accuracy or completeness. Health and safety precautions in this data sheet may not be adequate for all individuals and/or situations. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. No statement made in this data sheet shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents. No warranty is made, either express or implied.

Diamond Shamrock Refining Company, L.P.
MSDS Number: M7770

Page 1 of 8
Product Name: #2 DIESEL FUEL



A Member of the Ultramar Diamond Shamrock Group of Companies

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MSDS NUMBER: M7770
MSDS DATE: 01-01-02
PRODUCT NAME: #2 DIESEL FUEL

24 HOUR EMERGENCY PHONE : (210) 979-8346

TRANSPORTATION EMERGENCIES: CALL CHEMTREC AT 1-800-424-9300

MSDS ASSISTANCE: (210) 592-4593

MANUFACTURER'S NAME/ADDRESS:
DIAMOND SHAMROCK REFINING COMPANY, L.P.
P.O BOX 696000
San Antonio, Texas 78269-6000.

CHEMICAL NAME: Diesel Fuel, No.2

CAS NUMBER: 68476-34-6

SYNONYMS/Common Names: This Material Safety Data Sheet applies to the following product descriptions for Hazard Communication purposes only. Technical specifications and formulations vary greatly and are not reflected in this document. Consult specification sheets for technical information.

#2 DIESEL FUEL - Low-Sulfur, High-Sulfur, On-Road, Off-Road, Tax Exempt blends
#2 DISTILLATE - Low-Sulfur, High-Sulfur, On-Road, Off-Road, Tax Exempt blends
#2 FUEL OIL - Low-Sulfur, High-Sulfur, On-Road, Off-Road, Tax Exempt blends

Diamond Shamrock Refining Company, L.P.
 MSDS Number: M7770

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 Product Name: #2 DIESEL FUEL

PREMIUM DIESEL - Low-Sulfur, High-Sulfur, On-Road, Off-Road, Tax Exempt blends

2. COMPOSITION, INFORMATION ON INGREDIENTS

PRODUCT USE: This product is intended for use as a fuel in engines and heaters designed for diesel fuels, and for use in engineered processes. Use in other applications may result in higher exposures and require additional controls, such as local exhaust ventilation and personal protective equipment.

DESCRIPTION: Diesel fuel is a complex mixture of hydrocarbons from multiple refinery processes, blended to meet standardized product specifications. Composition varies greatly and includes C9 to C20 hydrocarbons with a boiling range of about 325-675° F. The following is a non-exhaustive list of common refinery process components, typical percentages, and exposure limits for each.

Component or Material Name	%	CAS Number	ACGIH Limits			OSHA Exposure Limits			
			TLV	STEL	Units	PEL	STEL	C/P	Units
Cat cracked distillate, light	0-100	64741-59-9	100*	NA	mg/m3	NA	NA	NA	NA
Hydrocracked distillate, light	0-100	64741-77-1	100*	NA	mg/m3	NA	NA	NA	NA
Hydrotreated distillate, middle	0-100	64742-46-7	100*	NA	mg/m3	NA	NA	NA	NA
Hydrotreated distillate, light	0-100	64742-47-8	100*	NA	mg/m3	NA	NA	NA	NA
Gas oil, light	0-100	64741-44-2	100*	NA	mg/m3	NA	NA	NA	NA

* NIOSH recommends an exposure limit of 100 mg/m3 for kerosene, which is similar to these components. The ACGIH has proposed an exposure limit of 100 mg/m3 for Diesel Fuel products, but it has yet to be adopted and has been placed on the Notice of Intended Change list.

3. HAZARDS IDENTIFICATION

HEALTH HAZARD DATA:

The major effect of exposure to this product is that it may cause giddiness, headache, central nervous system depression; possible irritation of eyes, nose, and lungs; and dermal irritation. Signs of kidney and liver damage may be delayed. Pulmonary irritation secondary to exhalation of solvent.

HAZARDS OF COMBUSTION PRODUCTS: Carbon monoxide and carbon dioxide can be found in engine exhaust and other forms of hydrocarbon combustion. Carbon Monoxide in moderate concentrations can cause symptoms of headache, nausea, vomiting, increased cardiac output, and confusion. Exposure to higher concentrations of carbon monoxide can cause loss of consciousness, heart damage, brain damage, and/or death. Exposure to high concentrations of carbon dioxide can cause simple asphyxiation by displacing available oxygen. Combustion of this and other similar materials should only be carried out in well ventilated areas.

MEDICAL CONDITION GENERALLY AGGRAVATED BY EXPOSURE: Medical conditions

Diamond Shamrock Refining Company, L.P.
MSDS Number: M7770

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Product Name: #2 DIESEL FUEL

which have the same symptoms and effects as those outlined under the health hazard information section can be aggravated by exposure to this product.

MEDICAL LIMITATION: N/A

ROUTES OF EXPOSURE

INHALATION: Irritation of the upper respiratory tract and eyes, with possible euphoria, dizziness, headache, discoordination, ringing in the ears, convulsions, coma, and respiratory arrest.

SKIN CONTACT: Defatting of the skin may occur with prolonged or repeated contact. Irritation and burning sensation may occur on exposure to the liquid or mists.

SKIN ABSORPTION: Not significant.

EYE CONTACT: Severe burning sensation with temporary irritation and swelling of lids.

INGESTION: Irritation of the mucous membranes of throat, esophagus and stomach which may result in nausea and vomiting; central nervous system depression may occur, if absorbed (see Inhalation above). If aspirated, chemical pneumonitis may occur with potentially fatal results. Possible kidney and liver damaged may be delayed. (See Notes To Physician in Section 5)

CARCINOGENICITY STATEMENT: #2 Diesel Fuel is not listed as carcinogenic by NTP, OSHA, ACGIH. IARC has listed Kerosene and light catalytic cracked distillates as probable human carcinogens (2A). Light paraffinic hydrotreated petroleum distillates are listed as confirmed human carcinogens by IARC (1):

4. FIRST AID MEASURES

EYES: Immediately flush eyes with large amount of water for at least 15 minutes holding lids apart to ensure flushing of the entire eye surface. **SEEK IMMEDIATE MEDICAL ATTENTION.**

SKIN: Wash contaminated areas with plenty of soap and water. A soothing ointment may be applied to irritated skin after thoroughly cleansing. Remove contaminated clothing and footwear. **SEEK IMMEDIATE MEDICAL ATTENTION.**

INHALATION: Get person out of contaminated area to fresh air. If breathing has stopped resuscitate and administer oxygen if readily available. **SEEK MEDICAL ATTENTION IMMEDIATELY.**

INGESTION: Never give anything by mouth to an unconscious person. If swallowed, do not induce vomiting. If vomiting occurs spontaneously, keep airway clear. **SEEK MEDICAL ATTENTION IMMEDIATELY.**

NOTES TO PHYSICIAN: Do not induce vomiting, use gastric lavage only. Aspiration of liquid into the lungs could result in Chemical Pneumonitis. Use of Adrenaline is not advised. Treat symptomatically.

5. FIRE AND EXPLOSION DATA

FLASH POINT: 100°F (PM) minimum

AUTOIGNITION TEMPERATURE: 494°F

FLAMMABLE LIMITS IN AIR: UEL: 5 %

LEL: 0.7 %

EXTINGUISHING MEDIA: Dry chemical, carbon dioxide, foam or water spray. Water may be ineffective in fighting fires of liquids with low flash points, but water should be used to keep fire-exposed

containers cool. If a leak or spill has not ignited, use water spray to disperse vapors and to protect persons attempting to stop a leak.

SPECIAL FIRE FIGHTING PROCEDURES: Pressure-demand, self contained, breathing apparatus should be provided for fire fighters in buildings or confined areas where product is stored.

UNUSUAL FIRE AND EXPLOSION HAZARD: Vapor accumulation is possible, and flashback can occur with explosive force if vapors are ignited.

6. ACCIDENTAL RELEASE MEASURES

If material is spilled, steps should be taken to contain liquid and prevent discharges to streams or sewer systems and control or stop the loss of volatile materials to the atmosphere. Spills or releases should be reported, if required to the appropriate local, state and federal regulatory agencies.

Small spills: Remove ignition sources. Absorb spilled material with non-combustible materials such as cat litter, dirt, sand, or petroleum sorbent pads/pillows. Do not use combustible materials like rags, wood chips, or saw dust. Remove contaminated materials to an appropriate disposal container.

Large spills: Remove ignition sources. Dike spill area with sand or dirt to contain material and cover sewers/drains. Remain upwind and keep unnecessary people away. Contact trained emergency response team for cleanup. Remove liquid using grounded suction pumps, isolate hazard area and deny entry.

7. HANDLING AND STORAGE INFORMATION

Store only in approved containers. Protect containers against physical damage. Outside or detached storage is preferred. Separate from oxidizing materials. Store in cool, well ventilated area of non-combustible construction away from possible sources of ignition. Keep away from incompatible materials and follow OSHA 29 CFR 1910.106 and NFPA 30 for storage requirements.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

VENTILATION REQUIREMENTS: Work in well ventilated areas using good engineering practices to process, transfer and store. Special ventilation is not required unless product is sprayed or heated. High volume use may require engineering controls.

SPECIFIC PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY: Respiratory protection is not required unless exposure levels exceed 100 mg/m³. Use NIOSH approved respiratory protection following manufacturer's recommendations where spray, mists, or vapors may be generated above the applicable exposure limits. Supplied air respiratory protection is required for IDLH areas. See 29 CFR 1910.134 for OSHA Respiratory Protection regulations.

EYE: Face shield and goggles or chemical goggles should be worn where mist or spray may be generated, and where splashing occurs. Shower and eyewash facilities should be accessible.

GLOVES: Impermeable protective gloves such as nitrile gloves should be worn during routine handling of this product. Barrier creams may also be appropriate where tactile sensitivity is required.

Diamond Shamrock Refining Company, L.P.

MSDS Number: M7770

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Product Name: #2 DIESEL FUEL

OTHER CLOTHING AND EQUIPMENT: Clothing contaminated with this product should be removed and laundered before reuse. Items which can not be laundered should be discarded. Allow contaminated items to air dry or hang in a well ventilated area. Spontaneous combustion or fire may result from contaminated materials being placed together before drying.

EXPOSURE MONITORING

BIOLOGICAL: No applicable procedure, breath analysis for hydrocarbons has been suggested.

PERSONAL/AREA: Based on similarity to kerosene, both active and passive monitors employing charcoal adsorption follow by gas chromatography. An average molecular weight of 170 has been suggested as the average value to convert the determined weight of hydrocarbons to ppm. Direct reading colorimetric tubes are available to evaluate short term exposure.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND ODOR: Colorless to straw or red oily liquid with characteristic kerosene-like odor. **VISCOSITY:** Spec. dependent, 1.7 - 3.4 cSt @ 104° F **pH:** NA

BOILING RANGE @ 760 mm Hg: 302-644° F

SOLUBILITY IN H₂O (wt. %): Insoluble

VAPOR DENSITY (Air=1): 4.5 (kerosene)

FREEZING POINT: -51° F

EVAPORATION RATE (BuAc=1): N/A

VAPOR PRESSURE: 0.5 mmHg @ 20 °C

SPECIFIC GRAVITY (H₂O=1): 0.865

% VOLATILES BY VOL.: NA

BULK DENSITY AT 60° F: 6.8-7.2 lbs./gal.

API GRAVITY: Specification dependent

10. STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY: Under normal conditions, the material is stable. Avoid sources of ignition such as flames, hot surfaces, sparks, and electrical equipment.

INCOMPATIBILITY: Avoid contact with strong oxidizers such as chlorine, concentrated oxygen, and sodium hypochlorite or other hypochlorites.

HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition products may include carbon monoxide and carbon dioxide, oxides of sulfur and nitrogen, and other toxic gasses.

HAZARDOUS POLYMERIZATION: Material is not known to polymerize.

11. TOXICOLOGICAL INFORMATION

1. NIOSH recommends that whole diesel exhaust be regarded as a potential occupational carcinogen; follow OSHA and MSHA rules where exhaust fumes may be generated.
2. A life time skin painting study by the American Petroleum Institute has shown that similar naphtha products with a boiling range of 350-700° F usually produce skin tumors and/or skin cancers in laboratory mice. Only a weak to moderate response occurred. The effect to humans has not been determined.
3. Positive results at 2.0 ml/kg and 6.0 ml/kg noted in mutagenesis studies via in-vivo bone marrow cytogenetics assay in rats.

Diamond Shamrock Refining Company, L.P.

MSDS Number: M7770

Product Name: #2 DIESEL FUEL

For more detailed information, contact MSDS Assistance at (210) 592-4593.

12. ECOLOGICAL INFORMATION

For detailed information, contact MSDS Assistance at (210) 592-4593.

13. DISPOSAL CONSIDERATIONS

Shipment, storage, disposal, and cleanup actions of waste materials are regulated under local, state and federal rules. Contact the appropriate agencies if uncertain of applicability. Waste product and contaminated material having a flash point below 140°F is considered a hazardous waste. DOT Hazardous Waste Number D001 applies. Consult 40 CFR 262 for EPA disposal requirements.

14. TRANSPORT INFORMATION

DOT PROPER SHIPPING NAME	Combustible Liquid, n.o.s.	Diesel fuel
DOT HAZARD CLASS*	Combustible Liquid	3*
DOT PACKING GROUP (PG)	III	III
I.D. NUMBER	NA1993	NA1993
REQUIRED LABELING	None	Flammable Liquid

* Since this product has a flash point >100°F and no other hazard class applies, it may be reclassified as a Combustible Liquid and NA1993 substituted for the product specific I.D. Number above. Consult 49 CFR 173.120 for specific details.

15. REGULATORY INFORMATION

TSCA (Toxic Substances Control Act) Inventory

Diesel Fuel is listed in the TSCA inventory.

SARA (Superfund Amendments and Reauthorization Act) TITLE III

This product is reportable under SARA Title III, Sections 311 & 312 as a hazardous substance.

Hazard Categories Applicable under 40 CFR 370.2 (SARA Section 311):

Acute Health	Chronic Health	Pressure	Fire	Reactive
Yes	Yes	No	Yes	No

Components listed under 40 CFR 372.65 (SARA Section 313):

This product does not contain chemicals identified as toxic by EPA under 40 CFR Part 372 and is

TO:Kristen Gary COMPANY:

Diamond Shamrock Refining Company, L.P.

MSDS Number: M7770

Product Name: #2 DIESEL FUEL

not subject to the reporting requirements of this section.

STATE REGULATIONS:

California Proposition 65: This product does not contain chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

16. OTHER INFORMATION

NFPA (National Fire Protection Association) Hazard Ratings Codes

Health	Fire	Reactivity	Other
1	2	0	

Based on "Standard System for the Identification of the Fire Hazards of Materials, NFPA No. 704 M

<p>This Material Safety Data Sheet was prepared by Ultramar Diamond Shamrock Corporation in accordance with 29 CFR 1910.1200. All information, recommendations and suggestions appearing herein concerning this product are based upon tests and data believed to be reliable, however, it is the user's responsibility to determine the safety, toxicity and suitability for his own use of the product described herein. Since the actual use by others is beyond our control, no guarantee expressed or implied is made by Ultramar Diamond Shamrock as to the effects of such use, the results to be obtained or the safety and toxicity of the product nor does Ultramar Diamond Shamrock assume any liability arising out of use by others of the product referred to herein. Nor is the information herein to be construed as absolutely complete since additional information may be necessary or desirable when particular or exceptional conditions or circumstances exist or because of applicable laws or government regulations.</p>

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MATERIAL SAFETY DATA SHEET

ARCHER PETROLEUM

10101 J ST, OMAHA, NE 68127

EMERGENCY TELEPHONE NUMBER: 1-(800)-798-6457

I. PRODUCT IDENTIFICATION

McCollister Code: 3180A
 Product Name: Dexron III/Mercon SB 837 1330
 Chemical Name: Lubricating Oil
 Chemical Family: Petroleum Hydrocarbon
 Trade Names: ARCHER PETROLEUM

II. TYPICAL CHEMICAL AND PHYSICAL PROPERTIES

Vapor Pressure (MM HG): Nil Vapor Density (Air=1) Nil
 Solubility (in water): Nil Melting Point: NA
 Specific Gravity (H₂O=1): .86 - .94
 Boiling Point °F(°C): Greater than 680°F (360°C)
 Evaporation Rate: Slower than n-Butyl Acetate
 Appearance and Odor: Amber Liquid, Slight Hydrocarbon Odor

III. HAZARDOUS COMPONENTS

<u>COMPONENT</u>	<u>CAS</u>	<u>Wt - %</u>	<u>ACGIH TLV</u>	<u>OSHA PEL</u>	<u>STEL</u>
Highly Refined Petroleum Oil	64742-65-0	80-95	5 mg/M ³	5 mg/M ³	10 mg/M ³

IV. FIRE AND EXPLOSION HAZARD DATA

Flammability Class: NFPA 704=1 NFPA 30=III-B Combustible
 Flash Point °F (°C) 370°F(188°C) - 455°F (235°C) (COC) LEL: n/av

EXTINGUISHING MEDIA:

According to the NFPA guide, use water fog. Foam. Dry chemical or CO₂. Do not use a direct stream of water.
 Product will float and can be reignited on the surface of water. Use water to cool containers

SPECIAL FIRE FIGHTING PROCEDURES AND PRECAUTIONS:

Material will not burn unless preheated. Do not enter confined fire-space without proper protective equipment including a positive-pressure NIOSH approved self-contained breathing apparatus. Use water to keep fire exposed containers cool.

V. REACTIVITY DATA

Stability (thermal, light, etc.): Stable
 Hazardous polymerization: will not occur
 Incompatibility (materials to avoid): strong oxidizers
 Conditions to avoid: extreme heat
 Hazardous decomposition products: carbon monoxide

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VI. HEALTH HAZARD DATA

EYE CONTACT:

Lubricating oils are generally considered no more than minimally irritating to the eyes.

SKIN CONTACT:

Brief contact is not irritating. Lubricating oils are generally considered no more than mildly irritating to the skin. Because of its defatting properties, prolonged and repeated contact may aggravate an existing or result in various skin disorders (dermatitis, folliculitis, etc.)

INHALATION:

Inhalation of vapor or oil mist (generated at high temperatures) may result in mild irritation of the upper respiratory tract, including irritation of the nose and throat, headache, nausea and drowsiness.

INGESTION:

No adverse effects expected. If more than several mouthfuls are swallowed, abdominal discomfort, nausea and diarrhea may occur.

VII. EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT:

Flush with water for 15 minutes while holding eyelids open. If irritation occurs, seek medical attention.

SKIN CONTACT:

Remove contaminated clothing and wipe off excess. Wash with plenty of soap and water or a waterless hand cleaner followed by soap and water. If irritation occurs, seek medical attention.

INHALATION:

Remove victim to fresh air. If breathing is difficult, provide respiratory support, and seek medical attention.

INGESTION:

Do not induce vomiting. Drink water. If uncomfortable, seek medical attention.

VIII. ENVIRONMENTAL PROTECTION and ACCIDENTAL RELEASE

SPILL OR LEAK PROCEDURE:

Stop source of leak if possible. Dike and contain spill. Remove with vacuum trucks or pump to storage salvage vessels. Soak up residue with absorbent such as clay, sand, etc. Dispose of in accordance with current applicable laws and regulations.

IX. EMPLOYEE PROTECTION

EYE / FACE PROTECTION:

Chemical – type goggles or face shield is recommended to prevent eye contact.

RESPIRATORY PROTECTION:

No special requirements under ordinary conditions of use and with adequate ventilation. If concentration exceeds occupational exposure limits (section III.) Use a NIOSH approved respirator.

PROTECTIVE CLOTHING:

Normal industrial eye protection, gloves, and other protective clothing as required to minimize contact with eyes and skin.

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IX. EMPLOYEE PROTECTION (Cont'd)**VENTILATION:**

Adequate to meet component occupational exposure limits.

EXPOSURE LIMIT FOR TOTAL PRODUCT:

None established for this product.

X. TOXICOLOGICAL INFORMATION**Median Lethal Dose (LD50 LC 50) (Species)**

Oral: believed to be >5 g/kg (rat); practically non-toxic

Inhalation: N.D.

Dermal: believed to be >5 g/kg (rabbit); no appreciable effect

Irritation Index, estimate of Irritation (Species)

Skin: believed to be <0.5 / 8.0 (rabbit); no appreciable effect

Eyes: believed to be < 15 / 110 (rabbit); no appreciable effect

Sensitization: N.D.

Other:

This product and its components are not classified as carcinogens by the International Agency for Research on Cancer (IARC) or OSHA. Used gasoline motor oils have been shown to cause skin cancer when repeatedly applied to mouse skin without any effort to remove the material between applications. There is no evidence of a causal relationship between skin cancer in humans and exposure to used motor oil.

XI. DISPOSAL CONSIDERATIONS**Waste Disposal Methods:**

This product has been evaluated for RCRA characteristics and does not meet the criteria of a hazardous waste if discarded in its purchased form. Under RCRA, it is the responsibility of the user of the product to determine at the time of disposal, whether the product meets RCRA criteria for hazardous waste. This is because product uses, transformations, mixtures, processes, etc. may render the resulting materials hazardous.

Remarks:

Recycle all used oils. Recycling used oils may provide exemptions related to hazardous waste regulations.

XII. TRANSPORTATION INFORMATION

D.O.T. Classification: Not Hazardous by D.O.T. Regulations

D.O.T. Proper Shipping Name: Not Applicable

This product is considered an oil under 49CFR (DOT) Part 130. If shipped by rail or highway in a tank with a capacity of 3,500 gallons or more, it is subject to the requirements of Part 130.

XIII. OTHER INFORMATION

The information contained herein is based upon data available to us and is believed to be accurate. However, we make no warranty, express or implied, regarding the accuracy of these data or the results to be obtained from the use thereof. We assume no responsibility for injury from the use of the product described herein.

Inquiries regarding MSDS should be directed to:

McCollister & Co.

Manager, Product Information and Safety

P.O. Box 587

Council Bluffs, IA 51502 - 0587

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DEERE & COMPANY
 John Deere Road, Moline, IL 61265
 1-800-822-8262

Material Safety Data Sheet

JOHN DEERE PRODUCT NAME: **Hy-Gard Transmission and Hydraulic Oil**

DATA SHEET NO: 8503-40,100
 LATEST REVISION DATE: 15 Feb. 1989
 DEERE CODE: Y3, Y38, XN, Y4
 JDM PART NO: TY6237, TY6238, TY6278,
 TY6354, AR69444, AR69445,
 TY22028, TY22062, TY22077,
 TY22078, TY22079, TY22080,
 TY22092

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

CHEMICAL NAME AND SYNONYMS: Lubricating Oil; Hydraulic Fluid; J20C
 CHEMICAL FAMILY: Hydrocarbon FORMULA: Complex

----- **SECTION II - HAZARDOUS INGREDIENTS** -----

<u>INGREDIENT</u>	<u>PERCENT</u>	<u>TLV/PEL</u>	<u>V.P.</u>	<u>CAS.#</u>
Solvent refined, hydrotreated, heavy paraffinic distillate	50-60	5 mg/m ³ *	-	64742547
Solvent refined, hydrotreated, middle distillate	0-25	5 mg/m ³ *	-	64742467
Severely hydrotreated light naphthenic distillate	0-25	5 mg/m ³ *	-	64742536
Polymeric additive in oil (poly-methacrylate)	10-15	None	-	None
Additive containing zinc dialkyl dithiophosphate	5- 6	None	-	Mixture

*for oil mists

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

BOILING POINT: N.A. SP. GRAVITY (WATER=1): 0.89
 % VOLATILE VOLUME: N.A. EVAPORATION RATE: N.A.
 VAPOR DENSITY: N.A. SOLUBILITY IN WATER: Insoluble
 APPEARANCE/ODOR: dark amber/slight odor N.A. - not available

----- **SECTION IV - FIRE & EXPLOSION HAZARD DATA** -----

FLASH POINT: 390° F C.O.C. FLAMMABLE LIMIT - LEL: N.A.
 EXTINGUISHING MEDIA: Water fog, foam, dry chemical, carbon dioxide, or halogenated
 agents.
 SPECIAL FIRE FIGHTING PROCEDURES: Do not use a direct stream of water. Product will
 float and can be reignited on surface of water. Cool fire exposed containers with
 water. Use NIOSH approved self-contained breathing apparatus.
 UNUSUAL FIRE & EXPLOSION HAZARDS: None



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

EXPOSURE LIMIT: See Section II - Hazardous Ingredients

EFFECTS OF OVEREXPOSURE: Exposure to vapors or mists of this product may cause mild upper respiratory tract irritation. Prolonged or repeated contact may cause various skin disorders such as dermatitis, oil acne, or folliculitis. Eye contact is minimally irritating. Effects of ingestion are expected to be relatively non-toxic. Exposure to product may aggravate preexisting skin and respiratory conditions.

EMERGENCY & FIRST AID: Eyes - flush with water 15 minutes. Skin - remove contaminated clothing; wash skin with soap and water; if material is injected under the skin, do not wait for symptoms to develop - get medical attention promptly to prevent serious damage. Inhalation - remove victim to fresh air and provide oxygen if breathing is difficult. Ingestion - do NOT induce vomiting. In all cases seek medical attention.

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

STABILITY: Stable

INCOMPATIBILITY: Avoid open flame, and oxidizing materials

HAZARDOUS POLYMERIZATION: Will not occur

DECOMPOSITION PRODUCTS: Dependent on combustion conditions. A complex mixture of airborne solid, liquid, and gas will evolve when this material undergoes pyrolysis or combustion. Oxides of carbon, sulfur, phosphorous, and other unidentified organic compounds may be formed.

----- SECTION VII - SPILL OR LEAK PROCEDURE -----

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Dike and contain. Use vacuum or an absorbent such as clay or sand to pick up. Flush area with water to remove trace residue. NOTE: This product is classified as an oil under the Clean Water Act.

Spills, entering surface waters or any watercourse or sewer leading to surface waters, must be reported to the National Response Center 800-424-9802.

WASTE DISPOSAL METHOD: In accord with federal, state, and local regulations

----- SECTION VIII - PROTECTIVE EQUIPMENT INFORMATION -----

VENTILATION: Local exhaust to keep TLV/PEL below acceptable levels

RESPIRATOR: NIOSH approved as needed EYE WEAR: Recommended

GLOVES: Recommended to minimize skin contact OTHER:

----- SECTION IX - SPECIAL PRECAUTIONS -----

Minimize skin contact. Wash with soap and water before eating, smoking, or using toilet facilities. Launder contaminated clothing before reuse. Properly dispose of contaminated articles including shoes that cannot be cleaned. Store in a cool, dry place with adequate ventilation. Keep away from open flames. Keep away from children.

----- SECTION X - DATA PREPARATION -----

NAME: T. M. Snyder, CIH

TITLE: Industrial Hygienist

SIGNATURE:

DATE: January 29, 1998

The information contained herein is believed to be accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Furthermore, vendee assumes the risk in use of the material.



CITGO Petroleum Corporation
P. O. Box 3758
Tulsa, Oklahoma 74102

Material Safety Data Sheet

Trade Name: CITGO No. 2 Fuel Oils, All Grades Date: September 26, 1997
CAS No.: 68476-30-2 Commodity Code: AG2FO
Synonyms: Fuel Oil, No. 2 Technical Contact: (918) 495-5933
CITGO Index No.: 5388 Medical Emergency: (918) 495-4700
CHEMTREC Emergency: (800) 424-9300

MATERIAL HAZARD EVALUATION

(Per OSHA Hazard Communication Standard [29 CFR 1910.1200])

Health Precautions: DANGER: Harmful or fatal if swallowed; can enter the lungs and cause damage. Contains Petroleum Distillates. If swallowed, do not induce vomiting. Call a physician immediately. Keep out of reach of children.

Safety Precautions: Combustible Liquid. Keep away from heat, flame and other potential ignition sources.

HMIS Rating¹: Health: 1* Flammability: 2 Reactivity: 0

1.0 GENERIC COMPOSITION / COMPONENTS

Components	CAS No.	%	Hazard Data
Petroleum Distillates (A complex mixture of hydrocarbons, having a viscosity range of 32.6 SUS to 37.9 SUS at 37.7° C (100°F).)	68476-30-2	100	Oral LD ₅₀ (rat): 9.0 ml/kg Dermal LD (rabbit): > 5 gm/kg Dermal Sensitization: Nonsensitizing Skin (rabbit): Irritant Eye (rabbit): Mild irritant Teratogenesis (rat): Negative

2.0 PHYSICAL DATA

PHYSICAL HAZARD CLASSIFICATION (Per 29 CFR 1910.1200)

Combustible	Yes	Flammable	No	Pyrophoric	No
Compressed Gas	No	Organic Peroxide	No	Reactivity	No
Explosive	No	Oxidizer	No	Stable	Yes

¹Hazard Rating: least-0; slight-1; moderate-2; high-3; extreme-4.

CITGO assigned these values based on an evaluation conducted pursuant to NPCA guidelines. Use of an asterisk (*) indicates that the material may present chronic health effects.

NA-Not Applicable

ND-No Data

NE-Not Established

CITGO No. 2 Fuel Oils, All Grades (AG2FO, September 26, 1997, CIN: 5388)

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2.0 PHYSICAL DATA (continued)

Boiling Point, 760 mm Hg, °C (°F):	160 - 360 (320 - 680)
Specific Gravity (0 °F) (H ₂ O = 1):	0.84
Vapor Density (Air = 1):	> 1
% Volatiles by Volume:	ND
Melting Point, °C (°F):	-29 (-20)
Vapor Pressure, mm Hg (25 °C):	2 - 26
Solubility in Water:	Negligible
Evaporation Rate:(n-butyl acetate = 1):	< 1
pH of Undiluted Product:	NA
Appearance and Odor:	
Dyed:	Red liquid, petroleum odor.
Undyed:	Water white to yellow tinted liquid, petroleum odor.

3.0 FIRE AND EXPLOSION DATA

Flash Point, OC, °C (°F):	ND
Flash Point, CC, °C (°F):	52 - 85 (125 - 185)
Autoignition Temperature, °C (°F):	254 - 285 (489 - 545)
NFPA Rating ² :	Health: <u>0</u> Flammability: <u>2</u> Reactivity: <u>0</u>
Flammable Limits (% by volume in air):	Lower: <u>0.6</u> Upper: <u>7.0</u>
Extinguishing Media:	CO ₂ , dry chemical, foam, water fog
Special Fire Fighting Procedure:	Wear self-contained breathing apparatus when in a confined area. Structural firefighter's protective equipment will only provide limited protection.
Unusual Fire or Explosion Hazard:	Fires involving the products represented by this MSDS may release irritating fumes.

4.0 REACTIVITY DATA

Stability:	Stable.
Conditions Contributing to Instability:	Heat, flame.
Incompatibility:	Oxidizing agents.
Hazardous Decomposition Products: (thermal, unless otherwise specified)	Carbon dioxide (CO ₂), smoke, fumes, hydrocarbons, carbon monoxide (CO) and oxides of nitrogen.
Hazardous Polymerization:	Hazardous polymerization is not expected to occur.

5.0 SPILL, LEAK AND DISPOSAL PROCEDURES

Procedure if Material is Spilled:

- Remove sources of heat or ignition; provide ventilation; contain leak.
- Small Spills: Absorb released material with non-combustible absorbent. Place into containers for later disposal. (See Waste Disposal section below.)

²Hazard Rating: least-0; slight-1; moderate-2; high-3; extreme-4.

CITGO assigned these values based on an evaluation conducted pursuant to NFPA guidelines.

NA-Not Applicable

ND-No Data

NE-Not Established

5.0 SPILL, LEAK AND DISPOSAL PROCEDURES (continued)

- **Large Spills:** Evacuate area in the event of significant spills. Adequately ventilate area and determine potential exposure conditions. Exposure potential may require the use of respiratory protection. Use protective clothing. Contain spill in temporary dikes to avoid product migration and to assist in recovery. Do not allow material to escape into sewers, ground water, drainage ditches or surface waters.
- Control ignition sources around spill area. Use of a fire fighting foam blanket on spilled material will reduce vapor release and fire potential.
- Administer first aid, as needed.
- OSHA regulations may require establishing a regulated area with site control.
- Report spills as required to appropriate federal, state and local authorities.

Waste Disposal:

- It is the responsibility of the user to determine if the material is a hazardous waste at the time of disposal.
- Transportation, treatment, storage and disposal of waste material must be conducted in accordance with RCRA regulations (see 40 CFR 260 through 40 CFR 271).
- State and/or local regulations may be more restrictive.
- Contact the RCRA/Superfund Hotline at (800) 424-9346 or your regional US EPA office for guidance concerning case specific disposal issues.

Protective Measures During Repair and Maintenance of Contaminated Equipment:

- Refer to Section 7.0 - Special Protection Information.
- Keep unnecessary persons from hazard area.
- Drain and purge equipment, as necessary, to remove material residues
- Use gloves constructed of impervious materials such as heavy nitrile and protective clothing if direct contact is anticipated.
- Provide ventilation to maintain exposure potential below applicable exposure levels.
- Eliminate heat and ignition sources.
- Remove contaminated clothing.
- Wash exposed skin thoroughly with soap and water.

6.0 HEALTH HAZARD DATA

Health Hazard Classification (Per 29 CFR 1910.1200):

Highly Toxic	No	Sensitizer	No
Toxic	No	Reproductive Effects	No
Corrosive	No	Mutagen	No
Irritant	Yes	Target Organ (skin)	Yes

Carcinogen:

Product/Component	CAS No.	Conc. (%)	NTP	IARC	OSHA	Other
No. 2 Fuel Oil	68476-30-2	100	No	Group 3	No	ND

Toxicity Summary:

If swallowed, this material can enter the lungs and cause severe damage.
This material can cause skin irritation.

NA-Not Applicable

ND-No Data

NE-Not Established

CITGO No. 2 Fuel Oils, All Grades (AG2FO, September 26, 1997, CIN: 5388)

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6.0 HEALTH HAZARD DATA (continued)

Major Route(s) of Entry: Inhalation of mists or vapors. Skin contact.

Acute Exposure Symptoms:

- Inhalation:** Inhalation of mists or vapors above applicable workplace exposure levels can cause transient euphoria, respiratory tract irritation, gastrointestinal irritation, headache, dizziness, or central nervous system depression. Studies with laboratory animals suggest that bronchoconstriction and respiratory impairment are associated with inhalation of high concentrations of fuel oil mists.
- Dermal:** This material can cause skin irritation.
- Eye:** This material can cause transient eye irritation including stinging, tearing and swelling.
- Ingestion:** Symptoms of fuel oil ingestion can include burning of mouth and upper gastrointestinal tract, stomach cramps, coughing, drowsiness, restlessness, irritability, vomiting, diarrhea and unconsciousness. In addition, breathing difficulty may develop. Coughing, pneumonia and painful breathing can suggest that the product has entered the lungs. Ingestion of large concentrations of product can cause convulsions, coma and death.
- Injection:** Injection under the skin, in muscle or into the blood stream can cause irritation, inflammation, swelling, fever, and systemic effects, including pulmonary edema, pneumonia and mild central nervous system depression. Injection of pressurized hydrocarbons can severe, permanent tissue damage.

Chronic Exposure Symptoms:

The products represented by this MSDS contain a mixture of petroleum hydrocarbons commonly referred to as "middle distillates." Laboratory data have associated some middle distillates with skin cancer when the material is applied repeatedly over the lifetime of the test animal.

Middle distillates similar to the products represented by this MSDS have been associated with liver and kidney damage in subchronic (90 day) inhalation studies of male rats. The relevance of these findings to human health is unclear.

Prolonged or frequent contact can cause the skin to dry or crack. Also, long term dermal exposure can cause an inflammation of the skin marked by redness, pain or itching (dermatitis).

Other Special Effects:

None.

Medical Conditions Aggravated by Exposure:

Individuals with chronic respiratory disorders, liver dysfunction or kidney disease can have these conditions aggravated by elevated exposure to vapors, mists or aerosols of this material.

First Aid and Emergency Procedures for Acute Effects:

- Inhalation:** Move victim to fresh air. If victim is not breathing, immediately begin cardiopulmonary resuscitation (CPR). If breathing is difficult, 100 percent humidified oxygen should be administered by a qualified individual. Seek medical attention immediately.
- Dermal:** Remove contaminated clothing. Wash exposed skin with soap and water. Launder clothing before use. Seek medical attention if tissue appears damaged or if irritation persists.
- Eyes:** Flush eyes with cool water while occasionally lifting and lowering eyelids. Remove contact lenses if worn. Seek medical attention if excessive tearing, irritation or pain persists.

NA-Not Applicable

ND-No Data

NE-Not Established

CITGO No. 2 Fuel Oils, All Grades (AG2FO, September 26, 1997, CIN: 5388)

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6.0 HEALTH HAZARD DATA (continued)

Ingestion: Do not induce vomiting. If spontaneous vomiting is about to occur, place victim's head below knees. Never give anything by mouth to a person who is not fully conscious. Seek medical attention immediately.

Injection: Injection under the skin, in muscle or into the blood stream is a medical emergency. Seek medical attention immediately.

Notes to Physician:

Inhalation: If cough or difficulty in breathing develops, evaluate for respiratory tract irritation, bronchitis, or pneumonitis. Administer 100 percent humidified supplemental oxygen with assisted ventilation as required. In symptomatic patients (coughing, choking, tachypnea, etc.), monitor blood gases to assure adequate ventilation. If vital signs become abnormal or symptoms develop, obtain a chest x-ray.

Ingestion: The viscosity at of this material is approximately 32 SUS at 100° F. Accordingly, upon ingestion, there is a high risk of pulmonary aspiration. Aspiration can result in chemical pneumonitis or lipoid pneumonia. Removal by careful gastric lavage with tight fitting, cuffed endotracheal tube may be considered.

Pulmonary edema can be managed with PEEP and supplemental oxygen. Antibiotics are indicated only if bacterial superinfection of the lungs occurs. Steroids have not been shown to be of benefit for hydrocarbon pneumonitis.

7.0 SPECIAL PROTECTION INFORMATION

Ventilation Requirements:

Use in well ventilated area. In confined spaces or when hot, mechanical ventilation may be required to maintain airborne concentrations below applicable work place exposure levels as evaluated by designated and properly trained individuals.

Applicable Workplace Exposure Levels:

Chemical Component	ACGIH TLV TWA ppm (mg/M ³)	ACGIH TLV STEL/ Ceiling (C) ppm (mg/M ³)	ACGIH TLV Skin notation?	OSHA PEL TWA ppm (mg/M ³)	OSHA PEL STEL/ Ceiling (C) ppm (mg/M ³)	OSHA PEL Skin notation?
Petroleum Distillates	NE	NE	NE	NE	NE	NE

Specific Personal Protective Equipment:

Personal protective equipment should be selected based upon the conditions under which this material is used. A hazard assessment of the work area for PPE requirements should be conducted by a qualified professional pursuant to OSHA regulations.

Respiratory: Only NIOSH or MSHA approved equipment should be used. Use of an organic vapor and dust/mist filter dual cartridge respirator is required when vapor and mist concentrations exceed the applicable workplace exposure levels. Respiratory protection should be selected on the basis of the maximum expected air concentration.

Eyes: Use safety goggles or chemical splash goggles if splashing is anticipated.

Dermal: Use gloves constructed of impervious materials such as heavy nitrile rubber if frequent or prolonged contact is expected.

Clothing or Equipment: Wear body-covering work clothes to avoid prolonged or repeated exposure. Remove contaminated clothing and laundry before reuse.

NA-Not Applicable

ND-No Data

NE-Not Established

CITGO No. 2 Fuel Oils, All Grades (AG2FO, September 26, 1997, CIN: 5388)

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8.0 TRANSPORTATION AND SPECIAL PRECAUTIONS

Storage: Do not use or store this product near heat, flame or other potential ignition sources. Do not store with oxidizers. Do not store this product in unlabeled containers. Keep container closed.

Danger: **Flammable or Combustible Liquid.** Vapors are heavier than air and may travel to an ignition source and flash back. Use only in a well ventilated area. Never siphon by mouth. Empty containers may contain product residues which can ignite with explosive force. Consult appropriate federal, state and local authorities before reusing, reconditioning, reclaiming, recycling or disposing of empty containers and/or waste residues of this product.

DOT Information:

Proper Shipping Name:	Fuel Oil, No.2
Hazard Class:	3
Hazard Identification No.:	UN 1202
Placard:	Flammable liquid

9.0 ENVIRONMENTAL DATA

Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA)

Section 313 - Toxic Chemicals:

This product is not known contain any components in concentrations above *de minimis* levels that are listed as toxic chemicals in 40 CFR Part 372 pursuant to the requirements of Section 313 of SARA.

Section 311/312 - Hazard Categories:

This product may meet one or more of the criteria for the hazard categories defined in 40 CFR Part 370 as established by Sections 311 and 312 of SARA as indicated below:

Immediate (Acute) Health Hazard:	<u>Yes</u>	Sudden Release of Pressure Hazard:	<u>No</u>
Delayed (Chronic) Health Hazard:	<u>Yes</u>	Reactive Hazard:	<u>No</u>
Fire Hazard:	<u>Yes</u>		

Section 302 - Extremely Hazardous Substances:

This product is not known to contain any components in concentrations greater than one percent that are listed as Extremely Hazardous Substances in 40 CFR Part 355 pursuant to the requirements of Section 302(a) of SARA.

Clean Water Act (CWA):

Under the CWA, discharges of crude oil and petroleum products to surface water without proper Federal and State permits must be reported immediately to the National Response Center at (800) 424-8802.

Comprehensive Environmental Response, Compensation & Liability Act (CERCLA) Section 102 Hazardous Substances:

As defined by CERCLA, the term "hazardous substance" does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance.

9.0 ENVIRONMENTAL DATA (continued)

California Proposition 65 (The Safe Drinking Water and Toxics Enforcement Act):

Warning: This material contains the following chemicals which are known to the State of California to cause cancer, birth defects or other reproductive harm, and are subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

<u>Component:</u>	<u>Effect:</u>
Diesel Engine Exhaust	Cancer

New Jersey Worker and Community Right-to-Know Act:

Fuel Oil (68476-30-2)

Toxic Substances Control Act (TSCA):

Reported in TSCA Inventory as:	Product	Components
No. 2 Fuel Oils	X	

10.0 LABELING

DANGER:

HARMFUL IF SWALLOWED - CAN ENTER LUNGS AND
CAUSE DAMAGE
CONTAINS PETROLEUM DISTILLATES
COMBUSTIBLE LIQUID
CAUSES SKIN IRRITATION
MAY CAUSE CANCER BASED ON ANIMAL DATA
TARGET ORGAN(S): Skin

HANDLING:

Keep away from heat, sparks and flames. Keep container closed.
Avoid breathing vapor or mists.
Avoid direct dermal contact.

FIRST AID:

If swallowed, do not induce vomiting.
Call a physician immediately.
In case of contact, remove contaminated clothing immediately and wash thoroughly with soap and water.

ALL STATEMENTS, INFORMATION, AND DATA PROVIDED IN THIS MATERIAL SAFETY DATA SHEET ARE BELIEVED TO BE ACCURATE AND RELIABLE, BUT ARE PRESENTED WITHOUT GUARANTEE, REPRESENTATION, WARRANTY, OR RESPONSIBILITY OF ANY KIND, EXPRESSED OR IMPLIED. ANY AND ALL REPRESENTATIONS AND/OR WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE SPECIFICALLY DISCLAIMED. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION OR PRODUCTS FOR THEIR PARTICULAR PURPOSE. NOTHING CONTAINED HEREIN IS INTENDED AS PERMISSION, INDUCEMENT OR RECOMMENDATION TO VIOLATE ANY LAWS OR TO PRACTICE ANY INVENTION COVERED BY EXISTING PATENTS, COPYRIGHTS OR INVENTIONS.

NA-Not Applicable

ND-No Data

NE-Not Established

CITGO No. 2 Fuel Oils, All Grades (AG2FO, September 26, 1997, CIN: 5388)

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WD-40**WD-40 Company****Material Safety Data Sheet****1 - Chemical Product and Company Identification**

Manufacturer: WD-40 Company	Chemical Name: Organic Mixture
Address: 1061 Cudahy Place (92110) P.O. Box 80607 San Diego, California, USA 92138 -0607	Trade Name: WD-40 Aerosol
Telephone: 1-800-448-9340	Product Use: Cleaner, Lubricant, Penetrant
Emergency only: 1-888-324-7596 (PROZAR)	MSDS Date Of Preparation: 5/16/07
Information: 1-888-324-7596	

2 - Hazards Identification**Emergency Overview:**

DANGER! Harmful or fatal if swallowed. Flammable aerosol. Contents under pressure. Avoid eye contact. Use with adequate ventilation. Keep away from heat, sparks and all other sources of ignition.

Symptoms of Overexposure:

Inhalation: High concentrations may cause nasal and respiratory irritation and central nervous system effects such as headache, dizziness and nausea. Intentional abuse may be harmful or fatal.

Skin Contact: Prolonged and/or repeated contact may produce mild irritation and defatting with possible dermatitis.

Eye Contact: Contact may be mildly irritating to eyes. May cause redness and tearing.

Ingestion: This product has low oral toxicity. Swallowing may cause gastrointestinal irritation, nausea, vomiting and diarrhea. The liquid contents are an aspiration hazard. If swallowed, can enter the lungs and may cause chemical pneumonitis.

Chronic Effects: None expected.

Medical Conditions Aggravated by Exposure: Preexisting eye, skin and respiratory conditions may be aggravated by exposure.

Suspected Cancer Agent:

Yes No X

3 - Composition/Information on Ingredients

Ingredient	CAS #	Weight Percent
Aliphatic Hydrocarbon	64742-47-8 64742-48-9 64742-88-7	45-50
Petroleum Base Oil	64742-65-0	15-25
LVP Aliphatic Hydrocarbon	64742-47-8	12-18
Carbon Dioxide	124-38-9	2-3
Non-Hazardous Ingredients	Mixture	<10

4 - First Aid Measures

Ingestion (Swallowed): Aspiration Hazard. DO NOT induce vomiting. Call physician, poison control center or the WD-40 Safety Hotline at 1-888-324-7596 immediately.

Eye Contact: Flush thoroughly with water. Get medical attention if irritation persists.

Skin Contact: Wash with soap and water. If irritation develops and persists, get medical attention.

Inhalation (Breathing): If irritation is experienced, move to fresh air. Get medical attention if irritation or other symptoms develop and persist.

5 – Fire Fighting Measures

Extinguishing Media: Use water fog, dry chemical, carbon dioxide or foam. Do not use water jet or flooding amounts of water. Burning product will float on the surface and spread fire.

Special Fire Fighting Procedures: Firefighters should always wear positive pressure self-contained breathing apparatus and full protective clothing. Cool fire-exposed containers with water. Use shielding to protect against bursting containers.

Unusual Fire and Explosion Hazards: Contents under pressure. Aerosol containers may burst under fire conditions. Vapors are heavier than air and may travel along surfaces to remote ignition sources and flash back.

6 – Accidental Release Measures

Wear appropriate protective clothing (see Section 8). Eliminate all sources of ignition and ventilate area. Leaking cans should be placed in a plastic bag or open pail until the pressure has dissipated. Contain and collect liquid with an inert absorbent and place in a container for disposal. Clean spill area thoroughly. Report spills to authorities as required.

7 – Handling and Storage

Handling: Avoid contact with eyes. Avoid prolonged contact with skin. Avoid breathing vapors or aerosols. Use with adequate ventilation. Keep away from heat, sparks, hot surfaces and open flames. Wash thoroughly with soap and water after handling. Do not puncture or incinerate containers. Keep can away from electrical current or battery terminals. Electrical arcing can cause burn-through (puncture) which may result in flash fire, causing serious injury. Keep out of the reach of children.

Storage: Do not store above 120°F or in direct sunlight. U.F.C (NFPA 30B) Level 3 Aerosol.

8 – Exposure Controls/Personal Protection

Chemical	Occupational Exposure Limits
Aliphatic Hydrocarbon	100 ppm TWA (ACGIH) 1200 mg/m ³ TWA (manufacturer recommended)
Petroleum Base Oil	5 mg/m ³ TWA (OSHA/ACGIH)
LVP Aliphatic Hydrocarbon	1200 mg/m ³ TWA (manufacturer recommended)
Carbon Dioxide	5000 ppm TWA (OSHA/ACGIH), 30,000 ppm STEL (ACGIH)
Non-Hazardous Ingredients	None Established

The Following Controls are Recommended for Normal Consumer Use of this Product

Engineering Controls: Use in a well-ventilated area.

Personal Protection:

Eye Protection: Avoid eye contact. Safety glasses or goggles recommended.

Skin Protection: Avoid prolonged skin contact. Chemical resistant gloves recommended for operations where skin contact is likely.

Respiratory Protection: None needed for normal use with adequate ventilation.

For Bulk Processing or Workplace Use the Following Controls are Recommended

Engineering Controls: Use adequate general and local exhaust ventilation to maintain exposure levels below that occupational exposure limits.

Personal Protection:

Eye Protection: Safety goggles recommended where eye contact is possible.

Skin Protection: Wear chemical resistant gloves.

Respiratory Protection: None required if ventilation is adequate. If the occupational exposure limits are exceeded, wear a NIOSH approved respirator. Respirator selection and use should be

based on contaminant type, form and concentration. Follow OSHA 1910.134, ANSI Z88.2 and good Industrial Hygiene practice.

Work/Hygiene Practices: Wash with soap and water after handling.

9 – Physical and Chemical Properties

Boiling Point:	323°F (minimum)	Specific Gravity:	0.817 @ 72°F
Solubility in Water:	Insoluble	pH:	Not Applicable
Vapor Pressure:	110 PSI @ 70°F	Vapor Density:	Greater than 1
Percent Volatile:	74%	VOC:	412 grams/liter (49.5%)
Coefficient of Water/Oil Distribution:	Not Determined	Appearance/Odor	Light amber liquid/mild odor
Flash Point:	131°F (concentrate) Tag Closed Cup	Flammable Limits: (Solvent Portion)	LEL: 1.1% UE:: 8.9%

10 – Stability and Reactivity

Stability: Stable

Hazardous Polymerization: Will not occur.

Conditions to Avoid: Avoid heat, sparks, flames and other sources of ignition. Do not puncture or incinerate containers.

Incompatibilities: Strong oxidizing agents.

Hazardous Decomposition Products: Carbon monoxide and carbon dioxide.

11 – Toxicological Information

The oral toxicity of this product is estimated to be greater than 5,000 mg/kg based on an assessment of the ingredients. This product is not classified as toxic by established criteria. It is an aspiration hazard.

None of the components of this product is listed as a carcinogen or suspected carcinogen or is considered a reproductive hazard.

12 – Ecological Information

No data is currently available.

13 - Disposal Considerations

If this product becomes a waste, it would be expected to meet the criteria of a RCRA ignitable hazardous waste (D001). However, it is the responsibility of the generator to determine at the time of disposal the proper classification and method of disposal. Dispose in accordance with federal, state, and local regulations.

14 – Transportation Information

DOT Surface Shipping Description: Consumer Commodity, ORM-D

IMDG Shipping Description: Aerosols, 2, UN1950

15 – Regulatory Information

U.S. Federal Regulations:

CERCLA 103 Reportable Quantity: This product is not subject to CERCLA reporting requirements, however, oil spills are reportable to the National Response Center under the Clean Water Act and many states have more stringent release reporting requirements. Report spills required under federal, state and local regulations.

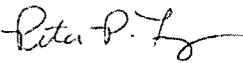
SARA TITLE III:

Hazard Category For Section 311/312: Acute Health, Fire Hazard, Sudden Release of Pressure

Section 313 Toxic Chemicals: This product contains the following chemicals subject to SARA Title III Section 313 Reporting requirements: None
Section 302 Extremely Hazardous Substances (TPQ): None
EPA Toxic Substances Control Act (TSCA) Status: All of the components of this product are listed on the TSCA inventory
Canadian Environmental Protection Act: All of the ingredients are listed on the Canadian Domestic Substances List or exempt from notification
Canadian WHMIS Classification: Class B-5 (Flammable Aerosol)
This MSDS has been prepared according to the criteria of the Controlled Products Regulation (CPR) and the MSDS contains all of the information required by the CPR.

16 – Other Information:

HMIS Hazard Rating:
Health – 1 (slight hazard), Fire Hazard – 4 (severe hazard), Reactivity – 0 (minimal hazard)

SIGNATURE:  TITLE: Director of Global Quality Assurance

REVISION DATE: Revision Date: May 2007

SUPERSEDES: December 2004

MATERIAL SAFETY DATA SHEET

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product:	AC-12, AC-17, AC-18, AC-20	Trade Name:	Air Compressor Oil
Manufacturer:	AGS Company	Common Name:	
Street Address:	2651 Hoyt St		
City/State/Zip	Muskegon Hts., MI 49444		
Phone:	800-253-0403	Original Issue Date:	11/14/1996
Phone:	231-733-2101	Revision No	6 Date
FAX:	231-733-1784		1/17/2007
Transportation Emergency	CHEM-TEL		
Phone:	800-255-3924		

SECTION 2 - COMPOSITION/ INFORMATION ON INGREDIENTS

ITEM	CAS NUMBER	WT/WT %
1 Distillates, petroleum, solvent-refined heavy paraffin	64741-98-4	60-100
2 Residual oils, petroleum, solvent-refined	64742-01-4	15-40
3 Zinc alkydithiophosphate	68649-42-3	0.1-1
4 Propriety ingredients	Proprietary Mixture	0.1-1

EXPOSURE LIMITS

ITEM	ACGIH		OSHA	
	TLV-TWA	TLV-STEL	PEL-TWA	PEL-CEILING
1	5 mg/m ³	10 mg/m ³	5 mg/m ³	N.E.
2	5 mg/m ³	10 mg/m ³	5 mg/m ³	N.E.
3	N.E.	N.E.	N.E.	N.E.
4	Not Known	Not Known	Not Known	Not Known

(See Section 16 for abbreviation legend)

SECTION 3 - HAZARDS IDENTIFICATION

EYE CONTACT: Liquid and vapors may be irritating and can cause pain, tearing, reddening and swelling.

SKIN CONTACT: Prolonged or repeated contact may result in irritation and/or dermatitis.

INHALATION: None expected.

INGESTION: This material may be harmful or fatal if swallowed.

CHRONIC HAZARDS: There are no foreseeable uses of the product that would lead to chronic exposure.

Primary Route(s) of Entry Skin and eye contact or ingestion.

SECTION 4 - FIRST AID MEASURES

EYE CONTACT: Immediately flush eyes with plenty of water. Get medical attention, if irritation persists.

SKIN CONTACT: Immediately flush with plenty of water. Remove clothing. Get medical attention immediately. Wash clothing separately before reuse.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get immediate medical attention.

INGESTION: Get medical attention immediately. If swallowed, DO NOT induce vomiting. Give victim a glass of water or

MATERIAL SAFETY DATA SHEET

milk. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person.

MATERIAL SAFETY DATA SHEET**SECTION 5 - FIRE FIGHTING MEASURES**

FLASH POINT: 471°F 244°C LOWER EXPLOSIVE LIMIT: N.D.
 UPPER EXPLOSIVE LIMIT: N.D.

AUTOIGNITION TEMPERATURE: N.D.

EXTINGUISHING MEDIA: Water fog, dry chemical, CO², foam, and alcohol foam

UNUSUAL FIRE AND EXPLOSION HAZARDS: Product can produce dense smoke from oils burning.

SPECIAL FIREFIGHTING PROCEDURES: Wear NIOSH/MSHA approved self-contained breathing apparatus and protective gear.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

RECOVERY PROCEDURES: Absorb spill with inert material then place in a chemical waste container.

SECTION 7 - HANDLING AND STORAGE

HANDLING: Wash thoroughly after handling

STORAGE: Keep away from heat, sparks, and flame.

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Use in well ventilated area. Local exhaust could be utilized to remove fumes.

RESPIRATORY PROTECTION: For most conditions, no respiratory protection should be needed, however, if high vapor concentration should develop, use a NIOSH approved organic vapor respirator.

SKIN PROTECTION: Where contact is likely, wear chemical resistant gloves.

EYE PROTECTION: Wear safety glasses with side shields or goggles.

OTHER PROTECTIVE EQUIPMENT: Eye wash in work area.

HYGIENIC PRACTICES: Wash hands before eating. Remove contaminated clothing and wash before reuse. Use only in a well ventilated area. Follow all MSDS/label precautions even after container is emptied because they may retain product residues. Avoid prolonged or repeated contact with eyes, skin, and clothing.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT	500°F	260°C	VAPOR DENSITY:	> 1
ODOR	Petroleum		ODOR THRESHOLD	N.D.
APPEARANCE	Amber		EVAPORATION RATE	Is slower than Butyl Acetate
SOLUBILITY IN H ₂ O	Negligible			
FREEZE POINT	N.D.		SPECIFIC GRAVITY	0.88
VAPOR PRESSURE	< 0.1 mmHg @ 38°C		pH @ 0.0%	N.A.
PHYSICAL STATE	Liquid		VISCOSITY:	N.D.
COEFFICIENT OF WATER / OIL DISTRIBUTION: Negligible				
(See Section 16 for abbreviation legend)				

MATERIAL SAFETY DATA SHEET
SECTION 10 - STABILITY AND REACTIVITY

CONDITIONS TO AVOID: Sources of ignition.

INCOMPATIBILITY: Strong acid or alkali, oxidizers and amines.

HAZARDOUS DECOMPOSITION PRODUCTS Oxides of carbon, nitrogen, sulfur, zinc and phosphorus.

HAZARDOUS POLYMERIZATION: Will not occur under normal conditions

STABILITY: This product is stable under normal storage conditions.

SECTION 11 - TOXICOLOGICAL PROPERTIES

COMPONENT TOXICOLOGICAL INFORMATION: No information available.

SECTION 12 - ECOLOGICAL INFORMATION

ECOLOGICAL INFORMATION: No information

SECTION 13 - DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: Dispose of in accordance with federal, state and local regulations.

SECTION 14 - TRANSPORTATION INFORMATION

DOT PROPER SHIPPING NAME Not Regulated

DOT TECHNICAL NAME N.A.

DOT HAZARD CLASS N.A. HAZARD SUBCLASS: N.A.

DOT UN / NA NUMBER: N.A. PACKING GROUP: NA RESP. GUIDE PAGE

SECTION 15 - REGULATORY INFORMATION

U.S FEDERAL REGULATIONS: AS FOLLOWS -

OSHA: Hazardous by definition of Hazard Communication Standard (29 cfr 1910.1200)

CERCLA - SARA HAZARD CATEGORY:

This product has been reviewed according to the EPA 'Hazard Categories' promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

Chronic health hazard

MATERIAL SAFETY DATA SHEET

SARA SECTION 313

This product contains the following substance subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

CHEMICAL NAME	CAS NUMBER	WT /WT % IS LESS THAN
No SARA Section 313 components exist in this product.		%

TOXIC SUBSTANCE CONTROL ACT:

This product contains the following chemical substances subject to the reporting requirements of TSCA 12 (B) if exported from the United States:

CHEMICAL NAME	CAS NUMBER
No components subject to reporting requirements of TSCA 12(b)	

U.S. STATE REGULATIONS: AS FOLLOWS -

NEW JERSEY RIGHT-TO-KNOW:

The following materials are non-hazardous, but are among the top five components in this product:

CHEMICAL NAME	CAS NUMBER
No non-hazardous materials are among the top five ingredients.	

PENNSYLVANIA RIGHT-TO-Know

The following non-hazardous ingredients are present in the product at greater than 3%:

CHEMICAL NAME	CAS NUMBER
No non-hazardous ingredients are present at greater than 3%	

CALIFORNIA PROPOSITION 65:

WARNING: The chemical(s) noted below and contained in this product, are know to the state of California to causes cancer, birth defects or other reproductive harm.

CHEMICAL NAME	CAS NUMBER
No Proposition 65 chemicals exist in this product.	

INTERNATIONAL REGULATIONS: AS FOLLOWS -

CANADIAN WHMIS: This MSDS has been prepared in compliance with Controlled Product Regulations except for use of the 16 headings.

CANADIAN WHMIS CLASS: No information available.

SECTION 16 - OTHER INFORMATION

HMIS RATINGS:	Health	0	Flammability	1	Phys. Haz.	0	PPE	A
NFPA	Health	0	Flammability	1	Reactivity	0		

VOLATILE ORGANIC COMPOUNDS (VOCs): 0 lbs / gal 0 grams / liter

LEGEND: N.A. Not Applicable N.E. Not Established
N.D. Not Determined

Disclaimer: The information contained herein is base on data available. However, no warranty is expressed or implied regarding the accuracy of the data or the results obtained from the use thereof. Because the information contained herein may be applied under conditions beyond our control, we assume no responsibility for its use.

Diethylene Glycol 1-10 Not Established
CAS# 111-46-6

<u>OTHER COMPONENTS</u>	<u>% WEIGHT</u>	<u>EXPOSURE GUIDELINE</u>		
		<u>Limits</u>	<u>Agency</u>	<u>Type</u>
Dipotassium Phosphate CAS# 7758-11-4	1-7	Not Established		

All components are listed on the TSCA inventory

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

3. HAZARDS IDENTIFICATION

Potential Health Effects:

Eye: Eye irritant. Contact may cause stinging, watering, redness, and swelling.

Skin: Contact may cause mild skin irritation including redness, and a burning sensation. Prolonged or repeated contact can worsen irritation by causing drying and cracking of the skin leading to dermatitis (inflammation). Contact may result in skin absorption but symptoms of toxicity are not anticipated by this route alone under normal conditions of use.

Inhalation (Breathing): Low degree of toxicity by inhalation.

Ingestion (Swallowing): Toxic. May be harmful if swallowed.

Signs and Symptoms: Effects of overexposure may include irritation of the nose and throat, irritation of the digestive tract, coughing, nausea, vomiting, diarrhea, transient excitation followed by signs of nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue), abdominal cramping, abdominal pain, muscle contractions, irregular heartbeats (arrhythmias), hypotension (low blood pressure), pulmonary edema (accumulation of fluids in the lungs), visual disturbances, convulsions and coma.

Cancer: Inadequate data available to evaluate the cancer hazard of this material.

Target Organs: Overexposure may cause injury to the kidney (see Section 11). Animal studies have shown that overexposure to a component may cause injury to the liver (see Section 11).

Developmental: Potential hazard to the fetus (see Section 11).

Other Comments: Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage (sometimes referred to as Solvent or Painters' Syndrome). Intentional misuse by deliberately concentrating and inhaling this material may be harmful or fatal.

Pre-Existing Medical Conditions: Conditions aggravated by exposure may include skin disorders, respiratory (asthma-like) disorders, kidney disorders and liver disorders.

4. FIRST AID MEASURES

Eye: Move victim away from exposure and into fresh air. If irritation or redness develops, flush eyes

with clean water and seek medical attention. For direct contact, hold eyelids apart and flush the affected eye(s) with clean water for at least 15 minutes. Seek medical attention.

Skin: Remove contaminated shoes and clothing and cleanse affected area(s) thoroughly by washing with mild soap and water. If irritation or redness develops and persists, seek medical attention.

Inhalation (Breathing): If respiratory symptoms develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion (Swallowing): If swallowed, seek emergency medical attention. If victim is drowsy or unconscious and vomiting, place on the left side with the head down and do not give anything by mouth. If victim is conscious and alert and ingestion occurred within the last hour, vomiting should be induced for ingestions of more than 1 swallow (1-2 tablespoons for an adult) preferably under direction from a physician or poison center. If possible, do not leave victim unattended and observe closely for adequacy of breathing.

Note To Physicians: This material contains ethylene glycol. Toxic metabolites of this material may cause acidosis, coma, convulsions, renal failure, or circulatory collapse. Ethanol blocks the formation of glycolic acid and therefore is the antidote of choice. Because of the rapid conversion (3-hour elimination half-life) of the ethylene glycol, ethanol should be administered as soon as possible in cases of severe poisoning. If medical care will be delayed several hours, use 3-4 one-ounce oral (shots) of 86-proof whiskey before or during transport to the hospital. The use of intravenous ethanol and hemodialysis effectively removes ethylene glycol and glycolic acid from the body.

5. FIRE FIGHTING MEASURES

Flammable Properties: Flash Point: 250°F/121°C (COC)
OSHA Flammability Class: Not applicable
LEL%: 3.2 / UEL%: 15.3
Autoignition Temperature: No Data

Unusual Fire & Explosion Hazards: This material may burn, but will not ignite readily. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.

Extinguishing Media: Dry chemical, carbon dioxide, alcohol-resistant foam, or water spray is recommended. Water or foam can cause frothing of materials heated above 212°F. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces.

Fire Fighting Instructions: For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces, or when explicitly required by DOT, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area, keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Move undamaged containers from immediate hazard area if it can be done with minimal risk.

Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done with minimal risk. Avoid spreading burning liquid with water used for cooling purposes.

6. ACCIDENTAL RELEASE MEASURES

This material may burn, but will not ignite readily. Keep all sources of ignition away from spill/release. Stay upwind and away from spill/release. Notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Wear appropriate protective equipment including respiratory protection as conditions warrant (see Section 8).

Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Dike far ahead of spill for later recovery or disposal. Use water sparingly to reduce disposal requirements. Spilled material may be absorbed into an appropriate absorbent material.

Notify fire authorities and appropriate federal, state, and local agencies. Immediate cleanup of any spill is recommended.

7. HANDLING AND STORAGE

Handling: Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits (see Sections 2 and 8).

Do not wear contaminated clothing or shoes. Use good personal hygiene practices.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1 and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

Storage: Keep container(s) tightly closed. Use and store this material in cool, dry, well-ventilated areas away from heat and all sources of ignition. Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits (see Section 2), additional ventilation or exhaust systems may be required.

Personal Protective Equipment (PPE):

Respiratory: A NIOSH certified air purifying respirator with an organic vapor cartridge/P95 Particulate Filter combination may be used under conditions where airborne concentrations are expected to exceed exposure limits (see Section 2).

Protection provided by air purifying respirators is limited (see manufacturer's respirator selection guide). Use a positive pressure air supplied respirator if there is potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air purifying respirators may not provide adequate protection.

A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.

Skin: The use of gloves impervious to the specific material handled is advised to prevent skin contact, possible irritation, and absorption (see glove manufacturer literature for information on permeability).

Eye/Face: Approved eye protection to safeguard against potential eye contact, irritation, or injury is recommended. Depending on conditions of use, a face shield may be necessary.

Other Protective Equipment: A source of clean water should be available in the work area for flushing eyes and skin. Impervious clothing should be worn as needed.

9. PHYSICAL AND CHEMICAL PROPERTIES

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm).

Appearance: Clear green

Physical State: Liquid

Odor: Odorless

pH: 10-11

Vapor Pressure (mm Hg): 18

Vapor Density (air=1): No Data

Boiling Point/Range: 330°F / 166°C

Freezing/Melting Point: No Data

Solubility in Water: 100%

Specific Gravity: 1.13 @ 60°F

Bulk Density: 9.39 lbs/gal

Flash Point: 250°F / 121°C (COC)

Flammable/Explosive Limits (%): LEL: 3.2 / UEL: 15.3

10. STABILITY AND REACTIVITY

Stability: Stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Conditions To Avoid: Avoid all possible sources of ignition (see Sections 5 and 7).

Materials to Avoid (Incompatible Materials): Avoid contact with strong oxidizing agents.

Hazardous Decomposition Products: Combustion can yield carbon dioxide and carbon monoxide.

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Ethylene Glycol (CAS# 107-21-1)

Target Organ(s): Ingestion of ethylene glycol by humans results in kidney damage (renal epithelial damage and oxalate crystals in the tubules). Administration of ethylene glycol resulted in hepatocellular hyaline degeneration in male mice fed diets containing 12,500 or 25,000 ppm ethylene glycol and female mice fed diets containing 50,000 ppm ethylene glycol.

Developmental: Ethylene glycol caused malformations in the offspring of mice and rats when administered by gavage or in the drinking water during organogenesis. It was not teratogenic when fed in the diet, by dermal application of up to 3550 mg/kg/day or by nose-only inhalation at up to 2500 mg/m³. No effects on fertility or reproductive performance were seen in a three-generation study in rats exposed orally.

Diethylene Glycol (CAS# 111-46-6)

Target Organ(s): Accidental human ingestion of diethylene glycol resulted in kidney damage (severe renal epithelial damage, tubular necrosis, and anuria). Liver damage (vacuolation and hyaline degeneration) was also seen in rats fed diets containing 1 to 4% diethylene glycol for 2 years.

12. ECOLOGICAL INFORMATION

Not evaluated at this time

13. DISPOSAL CONSIDERATIONS

This material, if discarded as produced, is not a RCRA "listed" hazardous waste. However, it should be fully characterized for toxicity prior to disposal (40 CFR 261). Use which results in chemical or physical change or contamination may subject it to regulation as a hazardous waste. Along with properly characterizing all waste materials, consult state and local regulations regarding the proper disposal of this material.

Container contents should be completely used and containers should be emptied prior to discard. Container rinsate could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations. Larger empty containers, such as drums, should be returned to the distributor or to a drum reconditioner. To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.

14. TRANSPORT INFORMATION

Note: Not classified as hazardous

15. REGULATORY INFORMATION

EPA SARA 311/312 (Title III Hazard Categories):

Acute Health: Yes
Chronic Health: Yes
Fire Hazard: No
Pressure Hazard: No
Reactive Hazard: No

SARA 313 and 40 CFR 372:

This material contains the following chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372:

Component	CAS Number	Weight %
Ethylene Glycol	107-21-1	90

California Proposition 65:

Warning: This material contains the following chemicals which are known to the State of California to cause cancer, birth defects or other reproductive harm, and are subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

--None Known--

Carcinogen Identification:

This material has not been identified as a carcinogen by NTP, IARC, or OSHA.

EPA (CERCLA) Reportable Quantity:

RQ #1 Ethylene Glycol
5000 lb equal to 5556 lb, (592 gal), of this material.

16. OTHER INFORMATION

Issue Date: 01/01/02
Previous Issue Date: 05/11/00
Product Code: 6940000000
Revised Sections: None
Previous Product Code: 6940000000
MSDS Number: 6940000000

Disclaimer of Expressed and Implied Warranties:

The information presented in this Material Safety Data Sheet is based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. **HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE.** No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

MATERIAL SAFETY DATA SHEET

SECTION I

MANUFACTURER'S NAME Clifton Chemical Co.		EMERGENCY TELEPHONE NO. (815) 697-2123
ADDRESS (Name, Street, City, State, and ZIP Code) 160 So. Locust St., Channah, IL, 60922		
CHEMICAL NAME AND SYNONYMS	TRADE NAME AND SYNONYMS Windshield Washer	
CHEMICAL FAMILY	FORMULA Mixture	

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS	N/A		BASE METAL	N/A	
CATALYST	N/A		ALLOYS	N/A	
VEHICLE	N/A		METALLIC COATINGS	N/A	
SOLVENTS	N/A		FILLER METAL PLUS COATING OR CORE FLUX	N/A	
ADDITIVES	N/A		OTHERS	N/A	
OTHERS	N/A				
HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES				%	TLV (Units)
Methyl Alcohol				38	200ppm
Nonylphenol Surfactant CAS # 68412-54-4				001	
Triphenylmethane CAS # 2650-18-2 EPA TSCA List- Yes				Tr.	

SECTION III PHYSICAL DATA

BOILING POINT (°F.)	N/A	SPECIFIC GRAVITY (H ₂ O=1)	.951
VAPOR PRESSURE (mm Hg)	N/A	PERCENT VOLATILE BY VOLUME (%)	N/A
VAPOR DENSITY (AIR=1)	N/A	EVAPORATION RATE (_____*)	N/A
SOLUBILITY IN WATER	Complete		
APPEARANCE AND ODOR	Blue-aromatic		

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	T.O.C. 112 F	FLAMMABLE LIMITS	Lel	Uel
EXTINGUISHING MEDIA	Dry chemical, CO ₂ or Alcohol foam			
SPECIAL FIRE FIGHTING PROCEDURES	Wear self-contained breathing			
ADDITIONAL				
UNUSUAL FIRE AND EXPLOSION HAZARDS	Vapor is heavier than air and may travel considerable distance to an ignition source.			

SECTION V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

Methyl Alcohol- 200ppm, 8 hour time-weighted average

EFFECTS OF OVEREXPOSURE

Ingestion- Poisonous, causes blindness, perhaps death. Inhalation- Narcosis, headache, nausea, loss of consciousness. Skin- Drying, irritation. Eye- Burning.

EMERGENCY AND FIRST AID PROCEDURES

Ingestion- Induce vomiting of conscious person, call M.D. Inhalation- Remove person to fresh air. Skin- Remove contaminated clothing and wash with water.

Eyes- Flush eyes with water for at least 15 min. Contact a physician immediately.

SECTION VI REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID Sparks, heat and flames.
	STABLE	X	
INCOMPATIBILITY (Materials to avoid)			
None			
HAZARDOUS DECOMPOSITION PRODUCTS			
Thermal decomposition may produce carbon dioxide and/or carbon monoxide.			
HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITION TO AVOID
	WILL NOT OCCUR	X	

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Place leaking container in well ventilated areas, eliminate ignition sources.

Avoid run-off into storm sewers and ditches which lead to natural waterways

WASTE DISPOSAL METHOD

Incineration, biological treatment of dilute solution.

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)

VENTILATION	LOCAL EXHAUST	SPECIAL OTHER
	MECHANICAL (General)	
PROTECTIVE GLOVES	EYE PROTECTION	
Neoprene or rubber gloves	Chemical safety goggles	
OTHER PROTECTIVE EQUIPMENT		

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Cannot be made non-poisonous.

OTHER PRECAUTIONS

SC015300

PORTAGAS Inc

(800)548-2288

P.O. BOX 2386 77223

Material Safety Data Sheet

Document #MS161064

PRODUCT NAME

(Description)
Compressed Air
Air Compressed, Synthetic

TRADE NAME & SYNONYMS

Calibration Gas -

Air Zero Grade
Air Ultra Zero
Air CO Free
20.9% Molar Oxygen, Nitrogen balance

CHEMICAL NAME & SYNONYMS

Air, Compressed

Air, Synthetic (19.5 - 23.5% Molar Oxygen, Nitrogen balance)

FORMULA

See above.

CAS NUMBERS

Air N/A
For Oxygen and Nitrogen see their respective MSDSs

CHEMICAL FAMILY

N/A

Judgements as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, Portagas Inc. extends no warranties, makes no representations, and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's, intended purposes or consequences of its use. Since Portagas Inc. has no control over the use of this product, it assumes no liability for damages or loss of product resulting from proper (or improper) use or application of the product. Data sheets may be changed from time to time. Be sure to consult the latest edition.

PORTAGAS Inc.
P.O. BOX 230039 HOUSTON, TX 77223

(800)548-2268

Material Safety Data Sheet

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE (TWA) EXPOSURE LIMITS (ACGIH 1986-87 and later)

N/A

SYMPTOMS OF EXPOSURE

Air is nontoxic; however, inhalation of air in high pressure environment circumstances, may result in impairment of coordination and dizziness.

TOXICOLOGICAL PROPERTIES

High pressure effects occur on the central nervous system.

RECOMMENDED FIRST AID TREATMENT

Treatment for the effects of breathing in a high pressure environment may be indicated.

POTENTIALLY HAZARDOUS MIXTURES WITH OTHER CHEMICALS

None

PORTAGAS Inc.
P.O. BOX 230039 HOUSTON, TX 77223

(800)548-2268

Material Safety Data Sheet

PHYSICAL DATA

MOLECULAR WEIGHT	SPECIFIC GRAVITY
28.966	Air = 1
VAPOR PRESSURE	
@70F, above Critical Temperature OF -220.4F	
LIQUID DENSITY AT BOILING POINT	GAS DENSITY AT STP
54.7 lb/ft ³ average	0.0749 lb/ft ³ average
FREEZING TEMPERATURE	SOLUBILITY IN WATER
-317.8F	0.0183 Bunsen coefficient

APPEARANCE AND ODOR

Shipped in compressed gas cylinders under pressure (typically 240 - 1000 psig).
Vapor is colorless and odorless.

FIRE & EXPLOSION HAZARD DATA

FLAMMABLE LIMITS % BY VOLUME

N/A

EXTINGUISHING MEDIA

Nonflammable gas

NFPA 704 NUMBER (HFR)

0 0 0

ELECTRICAL CLASSIFICATION

Nonhazardous

FLASH POINT

N/A

AUTO IGNITION TEMPERATURE

N/A

SPECIAL FIRE FIGHTING PROCEDURES

None.

UNUSUAL HAZARDS

When the mixture is involved in a fire, the compressed air at high pressures will accelerate the burning of materials at a greater rate.

REACTIVITY DATA

MS161064

3 of 5

Rev1 September 2002

PORTAGAS Inc.
P.O. BOX 230039 HOUSTON, TX 77223

(800)548-2268

Material Safety Data Sheet

STABILITY

Stable

INCOMPATIBILITY

None

HAZARDOUS DECOMPOSITION PRODUCTS

None

HAZARDOUS POLYMERIZATION PRODUCTS

None

CONDITIONS TO AVOID

N/A

ACTIONS TO BE TAKEN IN THE EVENT OF AN UNINTENDED RELEASE (LEAK)

FOR EMERGENCIES INVOLVING THIS PRODUCT CALL INFOTRAC (800)535-5053

If deemed necessary, and safe to do so, shut off the flow of gas and purge lines with an inert gas. Switch off non-essential electrical equipment.

WASTE DISPOSAL METHODS

Do not attempt to dispose of any unused quantities of product or their containers without contacting Portagas for instructions.

PERSONAL PROTECTION INFORMATION

RESPIRATORY/VENTILATION

None.

GLOVES

Any material.

EYES AND OTHER

Safety goggles or glasses only, contact lenses are not recommended
Steel toed/metatarsal protection shoes.

SPECIAL SAFETY AND REGULATORY CONSIDERATIONS

PORTAGAS Inc.

P.O. BOX 230039 HOUSTON, TX 77223

(800)548-2268

Material Safety Data Sheet

LABELING	DOT Shipping name:	Air, compressed
	DOT Shipping Label:	Nonflammable Gas
	Identification No.:	UN 1002
	Hazard Class, Div.:	Nonflammable Gas, 2.2
	IATA Packing Inst.:	200

HANDLING

Use only in well ventilated areas. The cylinder should be secured with a chain, strap on its side or by use of a stand when connected to a regulator. Do not drag, drop or roll the cylinder. Use both hands when carrying the cylinder. Do not heat the cylinder.

One-way check valves in the use line are recommended to prevent backflow. Systems should be cleaned "for Oxygen service" before first use.

STORAGE

Protect the cylinders from physical damage. Store the cylinders in a cool (<130F), dry, ventilated, posted "no smoking or open flames" area constructed of non-combustible materials, and away from aisles and other traffic areas. Keep full cylinders separated from empties. Rotate stock first-in, first-out (FIFO).

PACKAGING

Use the cylinders as provided, with the recommended regulator. Do not attempt to refill the cylinder or transfill the product from one container to another.

OTHER PRECAUTIONS

Do not attempt to refill the cylinder or transfill the product from one container to another.

GENERAL MOTORS CORPORATION MATERIAL SAFETY DATA SHEET

SECTION I

PRODUCT NAME OR NUMBER (as it appears on label) ALL MODELS OF DELCO BATTERIES		GM COMMON CODE
MANUFACTURER'S NAME Delco Remy Division, GMC		EMERGENCY TELEPHONE NO. (317) 646-3080
ADDRESS (Number, Street, City, State and Zip Code) 2401 Columbus Avenue, Anderson, IN 46018		MANUFACTURER'S D.U.N.S. NO.
HAZARDOUS MATERIAL DESCRIPTION, PROPER SHIPPING NAME, HAZARD CLASS, HAZARD ID NO. (49 CFR 172.101) Battery, Wet, Filled with Acid, (Corrosive Material) Class 8 - UN2794		
ADDITIONAL HAZARD CLASSES (as applicable)		
CHEMICAL FAMILY Liquid Content - Sulfuric Acid	FORMULA Liquid Content - H2SO4	

SECTION II — INGREDIENTS (list all ingredients)

CAS REGISTRY NO.	%W	%V	CHEMICAL NAME(S)	Listed as a Carcinogen in NTP, IARC or OSHA 1910(z) (specify)
7664939		37	Sulfuric Acid	NA
7732185		Bal.	Water	NA
7439921		> 90	Lead	NA
			Separator:	
			Daramic	
			Case and Cover: Polypropylene (Plastic)	

SECTION III — PHYSICAL DATA

BOILING POINT 233 °F °C	SPECIFIC GRAVITY (H ₂ O = 1) Varies with battery size	Average 1.280 ± .01	
VAPOR PRESSURE (@ 27 °F 25 °C) <input checked="" type="checkbox"/> mm Hg <input type="checkbox"/> psi	PERCENT VOLATILE BY VOLUME (%)	NA	PERCENT SOLID BY WEIGHT (%)
VAPOR DENSITY (AIR = 1)	EVAPORATION RATE (= 1)	NA	NA
SOLUBILITY IN WATER Miscible	pH =	< 1.0	
APPEARANCE AND ODOR Water - white liquid (acid content)	IS MATERIAL:		Liquid Solid Gas Paste Powder

SECTION IV — FIRE AND EXPLOSION HAZARD DATA

FLASH POINT NA °F °C	method used	FLAMMABLE LIMITS	LEL	UEL
EXTINGUISHING MEDIA			NA	NA
SPECIAL FIRE FIGHTING PROCEDURES Recommended self-contained breathing apparatus if batteries are involved in fire due to toxic fumes from burning plastic and acid fumes and vapors.				
UNUSUAL FIRE AND EXPLOSION HAZARDS While batteries are being charged, hydrogen gas is generated. Avoid open flames, spark or lighted matches. Acid, powerful oxidizers, can ignite combustible upon contact.				

SECTION V-HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE - Conditions to Avoid Contact with sulfuric acid results in rapid destruction of body tissue (burns).	THRESHOLD LIMIT VALUE <input checked="" type="checkbox"/> TLV=1 mg/m ³ PERMISSIBLE EXPOSURE LIMIT <input type="checkbox"/> Sulfuric Acid OTHER LIMIT <input type="checkbox"/>
PRIMARY ROUTES OF ENTRY Inhalation <input checked="" type="checkbox"/> Skin Contact <input type="checkbox"/> Other (specify) Ingestion	
EMERGENCY AND FIRST AID PROCEDURES Do not exceed 1 mg/m ³ TWA. Remove to fresh air. Get medical attention. EYE OR SKIN CONTACT: Flush with large volumes of water. Get medical attention. INGESTION: DO NOT induce vomiting. Give milk mixed with egg white if conscious.	

SECTION VI-REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	
INCOMPATIBILITY (materials to avoid) Oxidizing or reducing materials.			
HAZARDOUS DECOMPOSITION PRODUCTS: When heated, can emit highly toxic fumes.			
HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	XX	

SECTION VII-SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Lime or soda may be used to neutralize and/or flush with large volumes of water. Contain spill.	
WASTE DISPOSAL METHOD According to local, state, and federal regulations for acid or lead scrap.	
RCRA (Superfund) REPORTABLE QUANTITY (in lbs) 1,000 lbs.	
RCRA HAZARDOUS WASTE NO. (40 CFR 261.33) D002	
VOLATILE ORGANIC COMPOUND (VOC) (as packaged, minus water) NA	
<input checked="" type="checkbox"/> Theoretical 4 lb/gal	<input type="checkbox"/> Analytical NA lb/gal

SECTION VIII-SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type) Use NIOSH approved respiratory protection if 1 mg/m ³ TWA is exceeded (acid).		
VENTILATION	LOCAL EXHAUST (Specify Rate) Yes at charging stations	SPECIAL NA
	MECHANICAL (General) (Specify Rate)	OTHER NA
PROTECTIVE GLOVES (specify type) Rubber		EYE PROTECTION (specify type) Splash-proof safety g.
OTHER PROTECTIVE EQUIPMENT Use rubber boots and acid-proof clothing for major spills.		

SECTION IX-SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING Avoid skin contact. When charging batteries, avoid placing in areas where hydrogen can build up. DO not place near open flames, sparks, or lighted matches.	
OTHER PRECAUTIONS	

Seller agrees not to assert any claim (other than a claim for a patent infringement) against General Motors Corporation for any use or disclosure of any technical data or information disclosed in connection with this questionnaire.

PLEASE COMPLETE QUESTIONNAIRE AND RETURN TO:	Name (print) Robert A. Chisman
	Signature <i>Robert A. Chisman</i>
	Title Senior Industrial Hygienist
	Date May 8, 1991

ANSUL[®]ANSUL FIRE PROTECTION
MARINETTE, WI 54143-2542**MATERIAL SAFETY DATA SHEET****FORAY**

QUICK IDENTIFIER (In Plant Common Name)

Manufacturer's Name:	ANSUL FIRE PROTECTION	Emergency Telephone No.:	CHEMTREC (800) 424-9300
Address:	One Stanton Street, Marinette, WI 54143-2542	Other Information Calls:	(715) 735-7411
Prepared By:	Safety and Health Department	Date Prepared:	April 22, 1994

SECTION 1 — IDENTITY

Common Name: (used on label) (Trade Name and Synonyms)	FORAY Dry Chemical Extinguishing Agent	CAS No.:	N/A
Chemical Name:	N/A This is a Mixture	Chemical Family:	Mixture
Formula:	N/A		

SECTION 2 — INGREDIENTS

PART A — HAZARDOUS INGREDIENTS				
Principal Hazardous Component(s) (chemical and common name(s)):	Wt. %	CAS No.	ACGIH TLV	Acute Toxicity Data
Magnesium Aluminum Silicate (Attapulgate Clay)	5-7	8031-18-3	10 mg/M ³	NDA
PART B — OTHER INGREDIENTS				
Other Component(s) (chemical and common name(s)):	Wt. %	CAS No.		Acute Toxicity Data
Proprietary Mixtures of: Monoammonium Phosphate	65-82	7722-76-1		Oral (Rat) LD ₅₀ 5750 mg/kg
Ammonium Sulfate	12-22	7783-20-2		Oral (Rat) LD ₅₀ 3000 mg/kg
Calcium Carbonate	<2	1317-65-3	10 mg/M ³	NDA
Methyl Hydrogen Polysiloxane	<1	63148-57-2		NDA
Yellow Pigment	<.05	5468-75-7		NDA

SECTION 3 — PHYSICAL AND CHEMICAL CHARACTERISTICS (Fire and Explosion Data)

Boiling Point:	N/A	Specific Gravity (H ₂ O = 1):	N/A	Vapor Pressure (mm Hg):	N/A
Percent Volatile by Volume (%):	N/A	Vapor Density (Air = 1):	N/A	Evaporation Rate (= 1):	N/A
Solubility in Water:	Slight	Reactivity in Water:	Unreactive		
Appearance and Odor:	Yellow colored powder, no characteristic odor				
Flash Point:	None	Flammable Limits in Air % by Volume:	N/A	Extinguisher Media:	N/A
Auto-Ignition Temperature:	N/A				
Special Fire Fighting Procedures:	NONE — THIS IS AN EXTINGUISHING AGENT				
Unusual Fire and Explosion Hazards:	None				

SECTION 4 — PHYSICAL HAZARDS

Stability:	Unstable <input type="checkbox"/> Stable <input checked="" type="checkbox"/>	Conditions to Avoid:	N/A
Incompatibility (Materials to Avoid):	Strong alkalis, Mg, oxidizers that can release chlorine per NFPA 43A.		
Hazardous Decomposition Products:	NH ₃ and/or PO _x may be evolved		
Hazardous Polymerization:	May Occur <input type="checkbox"/> Will Not Occur <input checked="" type="checkbox"/>	Conditions to Avoid:	N/A

FORAY (Continued)

SECTION 5 — HEALTH HAZARDS

Threshold Limit Value:	OSHA nuisance dust limit of 15 mg/M ³ or ACGIH nuisance dust value of 10 mg/M ³ for the eight hour time-weighted average.		
Routes of Entry: Eye Contact:	Mildly irritating for a short period of time.		
Skin Contact:	May be mildly irritating.		
Inhalation:	Treat as a mineral dust. Irritant to the respiratory tract.		
Ingestion:	Not an expected route of entry.		
Signs and Symptoms:	Acute Overexposure: Transient cough, shortness of breath. Chronic Overexposure: Chronic fibrosis of the lung, pneumoconiosis.		
Medical Conditions Generally Aggravated by Exposure:	Reactive airway		
Chemical Listed as Carcinogen or Potential:	National Toxicology Program: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	I.A.R.C. Monographs: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	OSHA: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

SECTION 6 — EMERGENCY AND FIRST AID PROCEDURES

Eye Contact:	Flush with large amounts of water; if irritation persists, seek Medical attention.
Skin Contact:	Wash with soap and water; if irritation persists, seek Medical attention.
Inhalation:	Remove victim to fresh air. Seek Medical attention if discomfort continues.
Ingestion:	If patient is conscious, give large amounts of water and induce vomiting. Seek Medical help.

SECTION 7 — SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify Type):	Dust mask where dustiness is prevalent, or TLV exceeded. Mechanical filter respirator if exposure is prolonged.		
Ventilation:	Local Exhaust: Discretionary	Mechanical (General):	Recommended
Protective Gloves:	N/A	Eye Protection:	Recommended as mechanical barrier for prolonged exposure.
Other Protective Clothing or Equipment:	If irritation occurs, long sleeves and impervious gloves should be worn.		

SECTION 8 — SPECIAL PRECAUTIONS AND SPILL/LEAK PROCEDURES

Precautions to be Taken in Handling and Storage:	Should be stored in original container or Ansul fire extinguisher.
Other Precautions:	Do not mix agents.
Steps to be Taken in Case Material is Released or Spilled:	Sweep up.
Waste Disposal Methods:	Dispose of in compliance with local, state, and federal regulations.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM RATINGS

HAZARD INDEX:	
4 Severe Hazard	<u>1</u> HEALTH
3 Serious Hazard	<u>0</u> FLAMMABILITY
2 Moderate Hazard	<u>0</u> REACTIVITY
1 Slight Hazard	
0 Minimal Hazard	

N/A = Not Applicable NDA = No Data Available

ANSUL and FORAY are registered trademarks.

MATERIAL SAFETY DATA SHEET

PRODUCT SA 825 0012
ELL-BEE LITHIUM M-P GREASE

HAZARD RATING	4 - EXTREME	
	3 - HIGH	
	2 - MODERATE	
	1 - SLIGHT	
	0 - INSIGNIFICANT	

SECTION I

WITCO MANUFACTURING DIVISION OR SUBSIDIARY		EMERGENCY TELEPHONE	
1	ADDRESS (NUMBER, STREET, CITY, STATE, ZIP CONF)	MANUFACTURER 782-5800	
2		CHEM TREC 1-(800) 424-9300	
CHEMICAL NAME OR FAMILY		FORMULA	NA
3	Petroleum Hydrocarbon	A	

SECTION II - CHEMICAL AND PHYSICAL PROPERTIES

HAZARDOUS DECOMPOSITION PRODUCTS		FORM	
5	Carbon monoxide, carbon dioxide	8	Semi-solid
INCOMPATIBILITY (KEEP AWAY FROM)		ODOR	
6	Strong oxidizing agents such as: hydrogen peroxide, chromic acid, bromine	9	Mineral Oil
LIST ALL TOXIC AND HAZARDOUS INGREDIENTS		APPEARANCE	
7	None	10	Grease
		COLOR	
		11	Amber
		SPECIFIC GRAVITY	
		12	WATER = 1) RT 0.924
		BOILING PT.	
			NDA °C
			°F

SECTION III - FIRE AND EXPLOSION DATA

SPECIAL FIRE FIGHTING PROCEDURES		FLASH POINT (METHOD USED)	
Fire fighters should wear an approved self contained breathing apparatus.		Above C.O.C.	
24		26	190 °C 374 °F
		FLAMMABLE LIMITS %	
		27	
		NDA	
		LOWER UPPER	
UNUSUAL FIRE AND EXPLOSION HAZARDS		EXTINGUISHING AGENTS	
Dense smoke		<input checked="" type="checkbox"/> DRYCHEMICAL <input checked="" type="checkbox"/> CO, <input type="checkbox"/> WATERSPRAY <input checked="" type="checkbox"/> FOAM <input checked="" type="checkbox"/> WATERFOG <input checked="" type="checkbox"/> SAND/EARTH 28 - OTHER	
25			

SECTION IV - HEALTH HAZARD DATA

PERMISSIBLE CONCENTRATIONS (AIR)		VAPOR PRESSURE	
29	NDA	18 (mm Hg at 20 °C) NA	
EFFECTS OF OVEREXPOSURE		VAPOR DENSITY	
30	May cause skin & eye irritation with prolonged contact.	19 (AIR = 1) NA	
TOXICOLOGICAL PROPERTIES		pH AS IS	
31	NDA	20 pH () NA	
EMERGENCY FIRST AID PROCEDURES		STRONG ACID _____	
32	EYES Flush with large amounts of water for at least 15 min. Call a physician immediately.	STRONG BASE _____	
33	SKIN CONTACT Wash thoroughly with soap and water.	STABLE _____	
34	INHALATION NDA	UNSTABLE _____	
35	IF SWALLOWED Call a physician immediately.	21	
		VISCOSITY SUS AT 100 °F < 100 100 OR > XX	
		22	
		23 NA	

NA = NOT APPLICABLE

NDA = NO DATA AVAILABLE

< = LESS THAN

> = MORE THAN

MATERIAL SAFETY DATA SHEET

PRODUCT SA 825 0012

SECTION V - SPECIAL PROTECTION INFORMATION

VENTILATION TYPE REQUIRED (LOCAL, MECHANICAL, SPECIAL) None Required 36	PROTECTIVE GLOVES Rubber or plastic oil resistant 38
RESPIRATORY PROTECTION (SPECIFY TYPE) None Required 37	EYE PROTECTION Safety goggles and full face shield 39
	OTHER PROTECTIVE EQUIPMENT None Required 40

SECTION VI - HANDLING OF SPILLS OR LEAKS

PROCEDURES FOR CLEAN-UP

Transfer bulk of material into another container. Absorb remaining residue with proper absorbents such as sand, earth, vermiculite. Sweep up and dispose as solid waste in accordance to local, state and federal regulations.

41

WASTE DISPOSAL

By methods consistent with local, state and federal regulations.

42

SECTION VII - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Keep containers closed.

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SECTION VIII - TRANSPORTATION DATA

UNREGULATED BY D.O.T. <input checked="" type="checkbox"/> 44	U.S. D.O.T. PROPER SHIPPING NAME 47	
REGULATED BY D.O.T. <input type="checkbox"/> 45	U.S. D.O.T. HAZARD CLASS 48	I.D. NUMBER 49
TRANSPORTATION EMERGENCY INFORMATION CHEM TREC 1-(800) 424-9300 46	RC 50	LABEL(S) REQUIRED 51
	FREIGHT CLASSIFICATION Petroleum Lubricating Grease 52	
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SECTION IX - COMMENTS

KEEP OUT OF REACH OF CHILDREN!!

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SIGNATURE Ray G. Leonard TITLE Manager Technical Compliance

REVISION DATE _____ SENT TO ATTN: _____ DATE 3/05/84

SUPERSEDES _____

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.



MATERIAL SAFETY DATA SHEET

Tox no. : 042840

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Print Date : 04/02/90

Last Reviewed : 05/03/89

Part Type and Number

Part name

Ford - U.S. BATTERY - ALL
Motorcraft - U.S. BATTERY - ALL

BATTERY ELECTROLYTE
BATTERY ELECTROLYTE

----- CHEMICAL AND PHYSICAL PROPERTIES -----

Material type LIQUID
Specific Gravity 1.250
Boiling Point >135 C
Flash Point Not Applicable
pH 2.0

----- HAZARDOUS AND OTHER DISCLOSED INGREDIENTS -----

Percent Range	Exposure Limits - TWA ACGIH/OSHA (where est.)	CAS number	Chemical Name
>30-60	1/1 mg/m3	7664-93-9	SULFURIC ACID

Exposure Limit Abbreviations

TWA=Time Weighted Average C=Ceiling
S=Short Term Exposure Sk=Skin
Sol=Soluble Compounds Fu=Fumes
Insol=Insoluble Compounds Du=Dust

----- REGULATORY INFORMATION -----

This product contains a toxic chemical or chemicals subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

----- SIGNAL WORD -----

DANGER -- CORROSIVE

----- HAZARDS -----

Contact with this material will cause burns to the skin, eyes and mucous membranes.
When this material comes into contact with the eyes, serious damage may occur.
This product is harmful by Inhalation, when in contact with the skin and if it is swallowed.
This product is irritating to the eyes, respiratory system and skin.
This product may be fatal if it is swallowed.

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----- TARGET ORGANS AND MEDICAL CONDITIONS -----

Overexposure to some hazardous ingredients in this product has been found to affect certain body organs and systems in experimental animals and/or humans. These include:

Lungs
Teeth
Skin, Eyes, and Respiratory System

----- ACUTE TOXICITY INFORMATION -----

Based on the composition of the product identified by the supplier, selected portions of the acute toxicity information from RTECS are as follows:

7664-93-9 SULFURIC ACID
Inhalation, adult rat, LC50 = 510 mg/m³ (2 Hours)
Oral, adult rat, LD50 = 2140 mg/kg

----- SAFE HANDLING AND STORAGE -----

Do not breathe gas/fumes/vapor/spray.
Use this product with adequate ventilation.
Do not get this material in your eyes, on your skin, or on your clothing.
This is an oxidizing agent - avoid bringing it into contact with an organic material.
Store this product in air-tight containers away from sources of heat and light.

----- FIRE, EXPLOSION AND REACTIVITY INFORMATION -----

Bringing this product into contact with combustible material may cause a fire.
EXTINGUISHER INFORMATION: Dry chemical, foam, carbon dioxide.
Use water to cool fire-exposed containers and to protect personnel.
Wear self-contained breathing apparatus.
This product can react violently with reducing agents and organic materials.
Explosive HYDROGEN GAS may be released if aqueous solutions of this material come into contact with reactive metals (IRON, ZINC, ALUMINUM).
Irritating and/or toxic fumes and gases may be emitted upon heating of this product.
The decomposition of this product will release toxic gases.



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----- PROTECTIVE MEASURES AND TREATMENTS -----

Use of an impervious apron is recommended.
 Use general ventilation and use local exhaust, where possible, in confined or enclosed spaces.
 Wear chemical goggles and face shield.
 The use of neoprene gloves is recommended.
 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
 Immediately take off all contaminated clothing.
 If the material is swallowed, get immediate medical attention or advice --
 Give several glasses of water or milk.
 If gas/fume/vapor/dust/mist from the material is inhaled, remove the affected person immediately to fresh air.
 For skin contact flush with large amounts of water.
 Wash thoroughly after handling.

----- NOTES TO PHYSICIANS -----

If the product is ingested, probable mucosal damage may contraindicate the use of gastric lavage. Treat the affected person appropriately.

----- SPILLS, LEAKS AND DISPOSAL -----

Eliminate all sources of ignition or flammables that may come into contact with a spill of this material.
 Avoid skin contact and inhalation of vapors during disposal of spills.
 Dispose of waste material according to Local, State, and Federal Environmental Regulations.
 In case of large spills, follow all facility Emergency Response Procedures.

----- SPECIAL REMARKS -----

This is an acidic material.

----- U. S. DEPARTMENT OF TRANSPORTATION INFORMATION -----

Shipping name: BATTERY FLUID, ACID UN: 2790
 Hazard Class: Corrosive material Hazard Label: Corrosive

The chemical name(s) appearing below under "NAME" must appear as part of shipping name IF the amount being shipped in each container exceeds the quantity shown under "RQ" below. The letters "RQ" must also appear as part of the shipping name, in the form:

shipping name, chemical name, RQ.

For U.S. shipments from Ford Facilities, consult the "Ford Hazardous Material Transportation Control Program" Manual, otherwise consult 49CFR172.

-----CAS-- RQ(lbs) -NAME-----

7664-93-9 2777 SULFURIC ACID

M S D S
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----- PREPARATION INFORMATION -----

Health and safety information has been evaluated by:

Environmental & Occupational Toxicology, Occupational Health & Safety,
Ford Motor Company
900 Parklane Towers West, Dearborn, MI 48126

For emergency call: (313) 337-3182 -or- (313) 323-0045 (for 24 hour service)

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