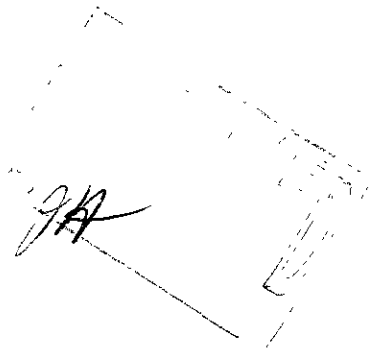

Health and Safety Plan

Tank Removal Activities

Port of Oakland

O.K. 5-23

Prepared for:

Accutite Environmental Engineering

Prepared by:

Environmental Health Consultants, Inc.

April 1, 1996

Environmental Health Consultants

This health and safety plan has been developed for the underground storage tank removal operations to be conducted for the Port of Oakland project site located in 707 Ferry Street in Oakland, California. The plan has been prepared by the individual listed below in accordance with project specifications, 8 CCR 5192 and other applicable regulations, and good industrial hygiene practice.

This plan is intended to apply to the excavation and removal of gasoline and diesel tanks only, and must not be extrapolated to other substances, work activities or project locations without modification to address the specific hazards associated with those substances, activities and/or any other specific regulatory requirements.

Irene S. Fanelli

Irene S. Fanelli, CIH

4/1/96

Date

1.0 Introduction

This Health and Safety Plan covers the activities to be carried out during the excavation and removal of underground fuel storage tanks located at 707 Ferry Street in Oakland, California. This plan is intended as a practical approach to the activities in light of the potential occupational and public health hazards. It is expected that site conditions may vary. This plan may be upgraded or downgraded at any time, as appropriate, in light of actual site conditions, at the discretion of the site health and safety officer.

This plan covers all contractors involved in the site activities. It serves as a minimum guideline for protective measures. Individual contractors may elect to implement more stringent measures for their own workers. Each contractor will provide health and safety equipment for its employees. All other personnel are expected to provide equal or greater levels of protection for themselves.

All on-site personnel, regulatory agency personnel, and visitors are expected to be familiar with, and comply with the provisions of this plan.

2.0 Site Background

The project site is located at the Port of Oakland. Specifically, the work location is 707 Ferry Street, CF-03, CF-05 Berth 25, in Oakland, California.

Two underground storage tanks at the site were used to store gasoline and diesel fuel. The current work plan calls for the emptying, cleaning, excavation, removal, and disposal of the tanks and associated accessible piping, and the excavation of surrounding soils. The excavated areas will then be backfilled and an aboveground 4,000 gallon tank will be installed.

3.0 Key Personnel and Responsibilities

On-site Project Supervisor - Willie Green

The on-site Project Supervisor is responsible for oversight of the site activities, including handling of hazardous materials. He is directly responsible for contractor personnel compliance with the health and safety plan, and will act as response coordinator in case of an emergency. The Project Supervisor will also function as the site Health and Safety Officer (HSO).

Certified Industrial Hygienist (CIH) - Irene S. Fanelli, Environmental Health Consultants, Inc.

The CIH will prepare the health and safety plan and provide any necessary support to the field operations in implementation of the plan.

4.0 Job Hazard Analysis

4.1 Physical Hazards

The major physical hazards associated with the site are expected to include:

a. Potential heat stress
b. Construction equipment
c. Noise
d. Manual material handling/demolition
e. Buried utilities/overhead power lines
f. Open excavations/uneven terrain
g. Fire/explosion
h. Tank removals
i. Confined space entry

Personnel working most directly with the construction activities, such as the operators, laborers and technicians, will have the greatest chance of encountering these hazards, however all personnel on site will have the possibility of encountering them at one time or another.

4.1.1 Heat Stress

All on-site personnel must be familiar with the symptoms of heat stress, and the conditions during which it may occur. Heat stress symptoms may include nausea, headache, lightheadedness, lack of coordination, or slurred speech. The use of protective clothing greatly enhances the likelihood of heat stress. Where site conditions warrant, the site health and safety officer will monitor for heat stress and implement work/rest regimens, if necessary. Potable water and/or an electrolyte replacement fluid such as Gatorade will be available on-site at all times.

4.1.2 Construction Equipment

Excavation equipment, cranes, and trucks may be used at the site. On-site personnel will be made aware of the presence of this equipment and the hazards of working around such equipment. All personnel operating such equipment will be made aware of the presence of other site personnel. Communication between workers on the ground and operators will be by line-of-sight, utilizing standard construction hand signals. Backup alarms and rollover protection will be utilized, as appropriate.

4.1.3 Noise

Work around heavy equipment always entails the possibility of excessive noise. Where excessive noise may be encountered, employees will be provided with hearing protection, such as earplugs or earmuffs.

4.1.4 Manual Material Handling/Demolition

Wherever possible, material handling will be done mechanically. Where manual handling is absolutely necessary, personnel will be instructed in safe handling techniques, and will be instructed to use the appropriate protective gear to prevent abrasions, cuts, and struck-by accidents. Personnel working from a manlift, such as during the demolition/removal of awnings, will be instructed in safe work practices for manlifts. Lifelines and safety belts/harnesses will be utilized as appropriate. Areas where overhead hazards may exist from falling debris will be marked as such, and unauthorized persons will be kept out of such areas.

4.1.5 Buried Utilities/Overhead Power Lines

Excavation areas will be examined by a locator, and utilities will be protected during excavation activities. Efforts will be made to

review site drawings and contact Base personnel to identify known locations of utilities. Underground Service Alert will be contacted at least two working days prior to the start of excavation. Protection from overhead power lines will be accomplished by maintenance of safe distances of at least 10 feet at all times.

4.1.6 Open Excavations/Uneven Terrain

All open excavations and ground openings will be protected from inadvertent entry. Any openings left open will be barricaded and/or covered to prevent entry by unauthorized personnel. Although most work in excavations deeper than four and one-half feet is expected to be accomplished mechanically, from outside the excavation, any excavations deeper than four and one-half feet into which personnel will be entering will be appropriately sloped, shored, and/or benched, and the appropriate OSHA permitting and notifications will be made. All excavations will be maintained with adequate means of egress for personnel working within.

Any obviously uneven terrain which poses a tripping hazard will be filled in or otherwise protected to prevent injury. Likewise, cleared walkways will be established around any debris and equipment on the ground, in order to minimize any tripping/contact hazard.

4.1.7 Fire/Explosion

The potential for fire/explosion exists while working with flammable materials such as gasoline. Appropriate measures will be taken to reduce this risk through proper monitoring of the tanks before excavation, washing and inerting of tanks and pipelines, bonding of pumping equipment to the tank, and through the maintenance on-site of adequate fire-fighting equipment, including a supply of ABC fire extinguishers.

The tanks are reportedly empty. The tanks will be inspected to verify the content of product. If product is present it will be removed prior to cleaning and removal. Special care must be taken to bond the tanks and pumping equipment, and to assure the pumping equipment is properly grounded in order to prevent static or other ignition sources.

During the placement of dry ice in the tanks and the pumping of product from the tanks, product vapors will be released to the atmosphere. Specific precautions must be made in order to prevent ignition of these vapors. These precautions include:

a) remove all ignition sources from the immediate work area.
b) keep pump trucks and other vehicles upwind of the vapor trail.
c) isolate any product spills immediately in order to restrict the spread of product and decrease the available surface area available for evaporation.
d) maintain an adequate supply of fire extinguishers in the work area.

4.1.8 Tank Removals

The actual tank removal presents a combination of physical hazards, such as possible entry into excavations, close work with heavy equipment such as backhoes or cranes to excavate and remove the tank, and the fire/explosion hazard from the potential combustion of materials remaining inside the tank. Protective measures for excavation work, work with heavy equipment, and proper tank monitoring and purging will be implemented. All tanks will be thoroughly tested for airborne combustibles and oxygen prior to, and during the removal process.

4.1.9 Confined Space Entry

Entry into confined spaces is not expected to take place during the on-site activities. IF CONFINED SPACE ENTRY IS REQUIRED,

APPROPRIATE CONFINED SPACE ENTRY PROCEDURES, INCLUDING MONITORING PROCEDURES, MUST BE IMPLEMENTED PRIOR TO ENTRY. Entry into any excavation must be evaluated for confined space conditions, i.e., oxygen deficiency, limited egress, etc. In addition, confined space entry must only be conducted with continuous on-site supervision by the HSO/On-site Project Supervisor.

4.2 Chemical Hazards

A summary of the characteristics of the chemicals known to be found in the tanks at the site is presented in Table 1. Substance data sheets are included in Appendix A. Chemical hazards may be encountered during any of the tank excavation and removal activities. During these operations, site personnel may be exposed to any or all of the chemicals noted in the table. Exposure to these chemicals may occur through inhalation, ingestion, or direct skin absorption/contact. Such exposure is expected to be minimized through proper work practices, personal protective equipment in accordance with ambient air monitoring, and proper personal hygiene. The primary vehicle for these materials is transport on dust and volatilization. Dust and vapor control measures will be utilized as appropriate. The potential for exposure to the public exists during the activities, however control measures taken will minimize any such exposure.

5.0 Monitoring Plan

Monitoring for combustible levels of vapors and for oxygen level will be performed prior to and during all activities involving contact with the tanks and sump. These levels will be monitored using a Gastech Model 1314 combustible gas meter. The instrument must be calibrated daily to ensure accurate readings. Calibration procedures will be in accordance with the manufacturers' recommendations.

6.0 Personnel Protection

6.1 Protective Equipment

The minimum level of protection for exclusion area personnel includes:

Hardhat
Steel-toed boots
Safety glasses

During excavation and any other activities where skin contact is a potential exposure mechanism, Tyvek or Polycoated Tyvek coveralls and neoprene or nitrile gloves and boots will be utilized.

In the event of a spill or pooling of product in or around the excavation, personnel will wear neoprene rubber gloves, chemical goggles, Polycoated Tyvek coveralls, chemical resistant boots, and a respirator with organic vapor cartridges.

Chemical goggles/safety glasses will be worn to prevent eye contact via splash or dust. Spray or steam-cleaning operations may warrant the use of full-face faceshields.

Hearing protection will consist of the worker's choice of earplugs or earmuffs.

North Brand half-mask and full-face respirators will be maintained in good condition on-site. Organic vapor cartridges will be provided for use with the respirators. All respiratory protection will be NIOSH/MSHA approved equipment.

The use of all protective equipment will be at the direction of the HSO, or upon the request of on-site personnel. Airborne dust or vapors may also be controlled through application of water spray.

Eyewash bottles will be maintained in the support area, along with the site first aid kit. ABC fire extinguishers will be maintained in the support area and on each piece of heavy equipment.

7.0 Work Zones and Site Security

7.1 Exclusion Area

The active work areas during excavation and tank removal activities will be considered exclusion zones. Such areas will be marked by barricades and warning tape, temporary construction fence, or other such measures. Access to these zones will be limited to authorized personnel with the appropriate protective equipment, who have met the training and medical requirements described in Sections 11 and 12, respectively.

7.2 Decontamination Area

All personnel working on site must pass through decontamination before proceeding to the support area. A temporary wash pad will be constructed for equipment decontamination, as necessary, in order to collect the wash water for disposal. Facilities for personnel decon will be located adjacent to the active work area. Personal protective equipment cleaning and storage areas will be included in the decontamination area.

7.3 Support Area

The support zone will be located adjacent to, and upwind (if possible) of the decontamination zone. Toilet facilities for site workers will be located in this area.

7.4 Site Security

The perimeter of the site will be surrounded by fencing at least six feet tall. The site will be secured in this manner for the duration of the project, and while soils are stockpiled at the designated staging area. All stockpiled soils will be covered with plastic sheeting and secured before the end of each work day.

8.0 Decontamination Procedures

8.1 Personal Decontamination

All disposable clothing will be deposited in containers on-site for off-site disposal. Wash tubs with soap and water and rinse tubs will be provided for decontamination of boots and gloves to be reused. Respirators will be cleaned with sanitizing wipes unless gross contamination requires heavier cleaning in separate wash and rinse tubs.

Soap and water will be available for personnel to wash up after work or if any skin contact occurs during the work day.

8.2 Equipment Decontamination

Any equipment that comes in contact with contaminated materials will be properly cleaned before leaving the site. Heavy construction equipment will be steam cleaned as necessary on a temporary decon pad. Smaller pieces of equipment will either be steam cleaned or washed in the same manner as contaminated personal protective equipment, i.e., with a brush and soapy water and rinse water.

8.3 Decontamination Materials

All decon water will be collected for disposal to a proper disposal site. Contaminated Tyvek suits and other contaminated disposable equipment will be collected for appropriate disposal.

9.0 General Site Safety Provisions

9.1 General Site Health and Safety and Work Rules

1. No drinking, gambling, or illegal drugs will be allowed on-site. Anyone reporting to work under the influence of alcohol and/or illegal drugs will be subject to disciplinary action. Any employee under a physician's care and/or taking prescribed narcotics must notify the HSO.

2. Personal protective equipment is required in designated areas. Such equipment may include, but is not limited to, respiratory protection, earplugs/earmuffs, hardhat, Tyvek coveralls, boots, gloves, chemical goggles, safety glasses, and protective faceshields.

3. Eating, drinking, smoking, and chewing gum or tobacco are allowed only in designated areas in the support zone. **Smoking is strictly prohibited in the exclusion zones due to the potential flammability hazard.**

4. Changes in work practices or work rules will be implemented only after approval by the project manager and the HSO.

5. Construction equipment always have the right-of-way over regular vehicles.

6. All employees entering the Exclusion Area must complete the required decontamination procedure before leaving the site.

7. All protective clothing to be worn inside the Exclusion Area will be supplied. None of this equipment will be permitted to leave the site with any employee for personal use. Also, any equipment to be used elsewhere for another project will be fully decontaminated before leaving the site.

8. Employees shall listen for warning signals on construction equipment and shall yield to construction equipment.

9. All equipment operators shall pay deliberate attention to watching for workers on the ground who may be in their path and provide these people with warning before moving.

10. All workers shall follow emergency procedures explicitly.

11. Kneeling and/or sitting directly on the ground in the exclusion area or decontamination area is prohibited.

12. All employees will utilize a buddy system while working on site.

9.2 Conditions of Site Access

1. All personnel must meet the medical monitoring requirements of 29 CFR 1910.120.

2. All employees must participate in the air quality exposure monitoring program by wearing the personal monitors or sampling devices designated by the HSO. Any employee refusing to participate in the program, or tampering with a sample, will be subject to disciplinary action.

3. No beards or long sideburns will be allowed since they interfere with the seal of the respirator to the face. Trimmed sideburns and mustaches are acceptable. All employees must report to work clean shaven because of the potential need for the use of respiratory protection.

4. All employees must complete the required training program prior to starting work at the site.

5. All on-site personnel must wear the prescribed health and safety equipment, and go through the decontamination procedures prior to exiting the site.

10.0 Emergency Procedures

The local response units for fire and paramedics will be notified of site activities, and will be provided with this Site Health and Safety Plan.

Summit Medical Center has been designated as the facility for treatment of injuries. Directions for the emergency route to the medical center are included in Table 2. This Table will be posted at various conspicuous locations around the site and in site vehicles that may be used to transport injured personnel. A list of the emergency telephone numbers is also included in Table 2, and will also be posted near the telephones and around the site.

Whenever possible, injured personnel will be decontaminated and/or moved to the support area for treatment as long as such procedures do not further compromise the health and safety of the individual.

On-site emergencies are expected to be restricted to potential fires and minor spills, and possible minor injuries to site personnel. On-site conditions are expected to be within the limits of measures which can be taken by on-site personnel. Any emergency which poses a potential threat to the public will be considered a situation requiring outside assistance from emergency response agencies. During any on-site emergency, work activities will cease until the emergency is brought under control.

11.0 Training

All on-site personnel working in the exclusion zone will have the appropriate prior experience and training, in compliance with 29 CFR 1910.120. Such training includes the 40-hour basic training, three days of supervised field experience, 8-hour update training, and 8-hour supervisory training, as appropriate.

Project-specific training will be provided prior to startup of on-site activities. This training will include:

a. Site health and safety plan
b. Decontamination
c. Personal protection levels
d. Chemical hazards
e. Physical hazards
f. Medical monitoring
g. Air monitoring
h. Use and maintenance of personal protective equipment
i. Work zones
j. Site safety rules and conditions of employment
k. Emergency provisions
l. Buddy system

On-site tailgate meetings will be held before each work day to reinforce pertinent topics from the above list and to anticipate problems that may arise during the day. The HSO and Project Supervisor will conduct these meetings. This training will be documented as part of the daily documentation for the site.

12.0 Medical Monitoring

All on-site personnel working in the exclusion zone will participate in a medical monitoring program.

The monitoring program will consist of either a corporate annual physical examination or a pre-employment physical (if the employee was hired specifically for this job).

13.0 Documentation

Documentation of each employee's compliance with the training and medical monitoring requirements, and their signature indicating they have read and will comply with this Health and Safety Plan, will be maintained on site and tracked on the Employee Records Verification Matrix, included as Table 3. In addition, the required permits for excavation, tank pulling, demolition, etc. will also be maintained on site.

Table 1
Chemicals of Concern

Material	Route of Entry[1]	PEL/TLV[2], (ppm[3])	Target Organs
Benzene	I,S,C,G[4]	0.1 CAL-OSHA=1.0	Blood, CNS[5], skin, bone marrow, eyes, respiratory system
Ethylbenzene	I,C,G	100	Eyes, upper respiratory system, skin, CNS
Gasoline	I,S,C,G	300	Skin, CNS, liver, kidneys, spleen, respiratory system
Inorganic Lead	I,C,G	0.05 mg/m^3	GI tract[6], CNS, kidneys, blood, gingival tissue
Tetraethyl Lead	I,S,C,G (skin)[7]	0.075 mg/m^3	Skin, upper respiratory tract, eyes, CNS
Toluene	I,S,C,G	50	CNS, liver, kidneys, skin
Xylenes	I,S,C,G	100	CNS, eyes, GI tract[9], blood, liver, kidneys, skin

Notes:

1. Data taken from the NIOSH Pocket Guide to Chemical Hazards, 1990.
2. PEL/TLV = The lowest of either the Federal OSHA Permissible Exposure Limit, CAL-OSHA Permissible Exposure Limit, or the Threshold Limit Value for exposure assigned by the American Conference of Governmental Hygienists (ACGIH).
3. All values are in units of parts per million (ppm) unless otherwise denoted.
4. I = Inhalation
   S = Skin contact
   C = Eye/Skin absorption
   G = Ingestion
5. CNS = central nervous system.
6. GI tract = Gastrointestinal tract.
7. (Skin) denotes that this chemical is absorbed directly through intact skin, as noted by the ACGIH.
8. GI tract = gastrointestinal tract.

Table 2
Emergency Telephone Numbers
And Emergency Route

Contact	Phone Number
Ambulance	911
Fire	911
Police	911
Hospital -- Summit Medical Center	(510) 420-6080
Accutite Environmental Engineering	(415) 952-5551
Environmental Health Consultants, Inc. Irene S. Fanelli, CIH - pager number	(415) 347-9205 (415) 598-7702

Directions to Summit Medical Center
350 Hawthorne Street
Oakland, CA

From the site, go north on Ferry to Petroleum Street and turn right. Turn left on Maritime Street and proceed north to West and turn right. Continue on West until it goes under I880 and turns into Grand Ave.. Continue east on Grand Ave. until it goes under I980 and turn left on Telegraph. Proceed north on Telegraph and turn right on Hawthorne Street.

Table 3
Employee Records Verification Matrix

Project Name_____ Project No._____ Page____of____

Employee Name	Company	Social Security Number	Date on Job	Annual Medical Exam (date)	40-hour Training & Refresher (dates)	Site-Specific Training (date)	Respirator Fit Test (date)	Supervisor's Training (date)	Level B Training (date)	Site Health and Safety Plan Read and Agreed To (Signature)

Environmental Health Consultants

APPENDIX A

CHEMICAL DATA SHEETS

HEALTH HAZARD INFORMATIONS

OSHA Standard: None established.

NIOSH Recommended Limit: Average 8 hour exposure -- 100mg/m3 (1).

ACGIH Recommended Limit: None established.

A - Short Term Exposure:
Inhalation: Does not evaporate fast enough to cause health effects except when heated or in enclosed spaces. Headache, tiredness, stupor, dizziness, nausea, coma and death, may occur with increasing exposure.

Skin: If not promptly removed, may cause reddening, blisters, itching and an increased risk of infection.

Eyes: Irritation may occur.

Ingestion: Accidental ingestion of unknown amounts has caused irritation of mouth, throat and stomach, vomiting, rapid breathing, blue skin coloration, and convulsions. Death may result from as little as 1 fluid ounce. Inhalation into the lungs following ingestion may result in bronchitis, chemical pneumonia, accumulation of fluid and blood in lungs, and death. As little as 1/30 oz. may be fatal in this way.

B - Long Term Exposure:
Prolonged or repeated skin contact with this product tends to remove skin oils possibly leading to irritation and dermatitis; however, based on human experience and available toxicological data, this product is judged to be neither a "corrosive" nor an "irritant" by OSHA criteria.

EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Move victim to fresh air. Give artificial respiration or oxygen as required. Seek medical attention as necessary.

Skin: Remove soaked clothing promptly. Wash affected areas with soap and water. Seek medical attention, if necessary.

Eyes: Wash eyes with water for 15 minutes. Seek medical attention as necessary.

Ingestion: Seek medical attention. Do not induce vomiting.

FIRE AND EXPLOSION INFORMATIONS

National Fire Protection Association (NFPA) - Hazard Identification:

Health	Flammability	Reactivity
0	2	0

General: Combustible; may ignite at 100 deg. F (38 deg. C).

Flammable or Explosive Limits:
(Approximate Percent by Volume in Air)
Estimated Values: Lower Flammable limit 0.9%
Upper Flammable limit 7.0%.

Extinguisher:
Use dry chemical, foam or carbon dioxide. Water may be ineffective, but water should be used to keep fire-exposed containers cool. If a leak or spill has ignited, use water spray to disperse the vapors and to protect men attempting to stop a leak. Water spray may be used to flush spills away from exposures. Minimize breathing gases, vapor, fumes or decomposition products. Use supplied-air breathing equipment for enclosed or confined spaces or as otherwise needed.

Decomposition Products Under Fire Conditions:
Fumes, smoke, carbon monoxide, aldehydes and other decomposition products, in the case of incomplete combustion.

SPECIAL PRECAUTIONS

A - Storage and Handling:

. Outdoor or detached storage is preffered. Indoors, where allowed, use a standard cabinet for combustible liquids.
. Do not use pressure to empty drums or explosion may result.
. Do not transfer liquid to an unlabeled container.
. Empty containers retain residue (liquid and/or vapor) and can be dangerous. Do not Pressurize, cut, weld, solder, drill, grind or expose such containers to heat, flame sparks or other sources of ignition; they may explode and cause injury or death.

B - Engineering Control:

. Keep containers closed when not in use. Do not handle or store near heat, sparks, flame, or strong oxidants.
. Ventilation as required.
. Sink, showers and eyewash stations should be readily available
. Use explosion proof equipment.
. Use should be limited to intended Diesel usage.
. Do not siphon by mouth. Minute amounts of liquid Diesel aspirated into the lungs may cause potentially fatal chemical pneumonitis.

C - Protective Clothing:

. Splash proof goggles, gloves, and coveralls are recommended if contact with Diesel is likely.
. Protective clothing should not be substituted for proper handling and engineering control.

D - Protective Equipment:

. Use chemical-resistant apron or other impervious clothing, if needed, to avoid contaminating regular clothing which could result in prolonged or repeated skin contact.
. Use supplied-air respiratory protection in confined or enclosed spaces, if needed.

PROCEDURES FOR SPILLS AND LEAKS

. Shut off and eliminate all ignition sources.
. Get all workers out of the spill area.
. Stop leak if you can do it without risk.
. Recover free product where possible.
. Add sand, earth or other suitable absorbent to spill area.
. Minimize breathing vapors.
. Minimize skin contact.
. Ventilate confined spaces. Open all windows and doors.
. Keep product out of sewers and watercourses by diking or impounding. For large spills dike far ahead of spill.
. Advise authorities if product has entered or may enter sewers, watercourses (like storm drains, creeks,...) or extensive land areas.
. Place sand and absorbent materials in containers for later proper disposal.
. Continue to observe precautions for flammable vapors from absorbed material.
. Inform and assure conformity with applicable governmental regulations.

WATER POLLUTION

. Dangerous to aquatic life in high concentrations.
. Fouling to shoreline.
. May be dangerous if it enters water intake.
. Notify local health and wildlife officials.
. Notify operators of nearby water intakes.

Aquatic Toxicity: 2990 ppm/24 hr/ bluegill/ TLm/ fresh water (1).

Waterfowl Toxicity: Data no available.

Biological Oxygen Demand (BOD): 53%, 5 days (1).

Food Chain Concentration Potential: None.

CHEMICAL REACTIVITY

. Reactivity with Water: No reaction
. Reactivity with common materials: No reaction
. Stability During Transport: Stable
. Neutralizing Agents for Acids and Caustics: Not pertinent
. Polymerization: Not pertinent
. Inhibitor of Polymerization: Not pertinent

. Conditions to Avoid: Avoid contact with liquid or fumes with any source of heat or flame. Strong oxidizers such as chlorine, permenganates and dichromates may cause fire or explosion.

PHYSICAL AND CHEMICAL PROPERTIES
(should not be used for precise design purposes)

. Solubility in water: Negligible less than 0.1% @ 1 ATM and 25 C (77), will float on surface.
. Physical State at 15 C and 1 atm: Liquid
. Molecular Weight: Approximately 212 average.
. Boiling Point at 1 atm: 320-650 deg. F = 160-350 deg. C.
. Pour, Congelation or Melting Point: -18 C (0 F), ASTM D 97.
. Specific Gravity: 0.86 at 15 C (liquid).
. pH: Essentially neutral.
. Vapor pressure: less than 1mm Hg @ 20 C.
. Vapor Density (air = 1): Greater than 5.
. Viscosity: 2.7 cSt @ 40 C.
. Percent volatile by volume: 100.
. Evaporation Rate @ 1 ATM and 25 C (77 F), (n-butyl acetate = 1): 0.02

NOTES AND REFERENCES

Notes:
The informations and recommendations contained herein are, to the best of Accutite's belief, accurate and reliable as of the date issued. Accutite does not warrant or guarantee their accuracy or reliability, and Accutite shall not be liable for any loss or damage arising out of the use thereof.

The information and recommendations are offered for the user's consideration and examination and it is part of the user's responsibility to satisfy itself that they are suitable and complete for its particular use.

The information and recommendations presented herein by Accutite should not be substituted for any Government required Employee Training program, unless approved by Implementing Agencies. This information is based on the materials from the references listed below.

Note (1) refers to informations specific to Diesel Fuel No 1.

References:

. Bureau of Toxic Substance Assessment, New York State Department of Health.
. Exxon Company USA, Diesel 2 MSDS issued 7/10/86.
. Hazardous Chemicals Data Book, G. Weiss, 1980.
. Patty's Industrial Hygiene and Toxicology, 3rd Revised Edition.

For additional details contact your local Department of Public Health.

HEALTH HAZARD INFORMATIONS

OSHA Standard: None established.

NIOSH Recommended Limit: None established.

ACGIH Recommended Limit: Threshold Limit Value (TLV) 300 ppm (900mg/m3) for an average 8-hour workday exposure.

A - Short Term Exposure:
Inhalation:Nose and throat irritation have been reported after exposure to 900 ppm for 1 hour. Drowsiness, dizziness, nausea and numbness may occur at 1,000 ppm after 15 minutes exposure. In animal studies, death occurred after 30,000 ppm for five minutes.

Skin:May cause itching and burning of the skin, and after a long exposure, redness and blistering.

Eyes: Moderate irritation of the eye has been reported after one hour exposure to 500 ppm. Mild irritation has been reported after an 8 hour exposure to 140 ppm.

Ingestion: Gasoline causes a burning sensation in the mouth, throat and stomach. Vomiting, diarrhea, drowsiness and intoxication may follow. As little as 3 to 4 ounces may be fatal. Inhalation of liquid gasoline into the lungs following ingestion or vomiting may result in an accumulation of fluid in the lungs, rapid breathing or death.

B - Long Term Exposure:
Continuous 8 hour exposure to 200 ppm has resulted in eye irritation only. Long term exposure may produce fatigue, muscle weakness, nausea, vomiting and abdominal pain. Hexane, a component of gasoline, can produce nerve damage resulting in tremors, numbness of hands and feet and loss of muscle control. Benzene, also a gasoline component, has been linked to blood disorders in man, including leukemia. Lead additives can produce nausea, cramps, loss of appetite, sleep problems, headaches and agitation.

EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Move victim to fresh air. Give artificial respiration or oxygen if necessary. Seek medical attention.

Skin: Remove clothing contaminated with gasoline. Wash affected areas with soap and water.

Eyes: Wash eyes with large amounts of running water for 15 minutes. Seek medical attention.

Ingestion: Do not induce vomiting, get medical attention immediately.

FIRE AND EXPLOSION INFORMATIONS

National Fire Protection Association (NFPA) - Hazard Identification

Health (blue)	Flammability (red)	Reactivity (yellow)
1	3	0

General: Highly flammable, vapors will explode, fumes may spread great distances to flame and flash back. Gasoline will ignite at -50 deg. F (-45 deg. C).

Flammable or Explosive Limits: (Approximate Percent by Volume in Air)
Estimated Values: Lower Flammable limit 1.4%
Upper Flammable limit 7.6%.

Extinguisher:
Foam, dry chemical or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.
If a leak or spill has ignited, use water spray to disperse the vapors and to protect men attempting to stop the leak. Water spray may be used to flush spills away from exposures. Minimize breathing gases, vapor, fumes or decomposition products.

Decomposition Products Under Fire Conditions:
Fumes, smoke, carbon monoxide, aldehydes and other decomposition products, in the case of incomplete combustion.

SPECIAL PRECAUTIONS

Storage and Handling:

. Keep containers tightly closed and out of direct sunlight. Outdoor or detached storage is preferred. Indoors, where allowed, use a standard cabinet for combustible liquids.
. Do not use pressure to empty drums or explosion may result.
. Do not transfer liquid to an unlabeled container.
. Empty containers retain residue (liquid and/or vapor) and can be dangerous. Do not Pressurize, cut, weld, solder, drill, grind or expose such containers to heat, flame sparks or other sources of ignition; they may explode and cause injury or death.

Engineering Control:

. Keep containers closed when not in use. Do not handle or store near heat, sparks, flame, or strong oxidants.
. Adequate ventilation sufficient to prevent exceeding recommended exposure limit or buildup of explosive concentrations of vapor in air.
. Use explosion proof equipment.
. Use as a motor fuel only. Do not use as a cleaning solvent, or thinner, or for other non-motor fuel uses.
. Do not siphon by mouth. Minute amounts of liquid gasoline aspirated into the lungs may cause potentially fatal chemical pneumonitis.

Protective Clothing:

. Splash proof goggles, gloves, and coveralls are recommended if contact with gasoline is possible.
. Protective clothing should not be substituted for proper handling and engineering control.

PROCEDURES FOR SPILLS AND LEAKS

. Shut off and eliminate all ignition sources.
. Get all workers out of the spill area.
. Stop leak if you can do it without risk.
. Recover free product where possible.
. Add sand, earth or other suitable absorbent to spill area.
. Contain spill to a confined area by diking with sand, earth or other suitable absorbent.
. Minimize breathing vapors.
. Minimize skin contact.
. Ventilate confined spaces. Open all windows and doors.
. Keep product out of sewers and watercourses by diking or impounding. For large spills dike far ahead of spill.
. Advise authorities if product has entered or may enter sewers, watercourses (storm drains, creeks,...) or extensive land areas.
. Place sand and absorbent materials in containers for later proper disposal.
. Continue to observe precautions for volatile, flammable vapors from absorbed material.
. Inform and assure conformity with applicable governmental regulations.

WATER POLLUTION

. Harmful to aquatic life in very small concentrations.
. Fouling to shoreline.
. May be dangerous if it enters water intake.
. Notify local health and wildlife officials.
. Notify operators of nearby water intakes.

- Aquatic Toxicity: 90 ppm/24 hr juvenile American shad/ TIm/ fresh water. 91 mg/l/24 hr/juvenile American shad/ TLm/ salt water.
- Waterfowl Toxicity: Data no available.
- Biological Oxygen Demand (BOD): 8%, 5 days.
- Food Chain Concentration Potential: none.

CHEMICAL REACTIVITY

. Reactivity with Water: No reaction
. Reactivity with common materials: No reaction
. Stability During Transport: Stable
. Neutralizing Agents for Acids and Caustics: Not pertinent
. Polymerization: Not pertinent
. Inhibitor of Polymerization: Not pertinent

. Conditions to Avoid: Avoid contact with liquid or fumes with any source of heat or flame. Strong oxidizers such as chlorine, permanganates and dichromates may cause fire or explosion.

PHYSICAL AND CHEMICAL PROPERTIES

(should not be used for precise design purposes)

. Solubility in water: Negligible, (less than 0.1% @ 1 atm. and 25 C (77F)), will float on surface.
. Physical State at 15 C and 1 atm: Liquid
. Molecular Weight: Not pertinent
. Boiling Range: 140 - 390 F = 60 - 199 C.
. Freezing Point: Not pertinent.
. Specific Gravity: 0.7321 at 20 C (liquid)
. Vapor pressure: Varies seasonally from approximately 5 to 15 psi Reid Vapor Pressure.
. pH: Essentially neutral.
. Evaporation: Gasoline evaporates rapidly. The fumes are heavier than air and will sink.
. Vapor (Gas) Specific Gravity: 3.4 to 5
. Viscosity: Approximately 0.5 cSt @ 25 C.
. Percent Volatile by Volume: 100
. Evaporation Rate @ 1 atm. and 25 C (77 F) (n-Butyl Acetate = 1): approximately 10 - 11.

NOTES AND REFERENCES

Notes:
The information and recommendations contained herein are, to the best of Accutite's belief, accurate and reliable as of the date issued. Accutite does not warrant or guarantee their accuracy or reliability, and Accutite shall not be liable for any loss or damage arising out of the use thereof.

The information and recommendations are offered for the user's consideration and examination and it is part of the user's responsibility to satisfy itself that they are suitable and complete for its particular use.

The information and recommendations presented herein by Accutite should not be substituted for any Government required employee training program, unless approved by enforcing Agencies. This information is based on materials from the references listed below.

References:
. Bureau of Toxic Substance Assessment, New York State Department of Health.
. Exxon Company USA, Jobber Unleaded Gasoline 87, MSDS issued 7/1/85.
. Hazardous Chemicals Data Book, G. Weiss, 1980.
. Patty's Industrial Hygiene and Toxicology, 3rd Revised Edition.

For additional details contact your local Department of Public Health.