EXCELTECH

SITE SAFETY PLAN

FOR

PACIFIC RENAISSANCE PLAZA SOIL EXCAVATION PROJECT OAKLAND, CALIFORNIA

Project No. 350024-51
October 1990

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SECTION 1

INTRODUCTION

This Site Safety Plan delineates the basic safety requirements for the Soil Excavation Project at the Pacific Renaissance Plaza construction site in Oakland, California.

The provisions set forth in this plan will apply to the employees of Perini Corporation and their subcontractors working on this project. The subcontractors working on this project may elect to modify these provisions, but only to upgrade or increase the safety requirements, and only with Perini's written concurrence.

This Site Safety Plan addresses the expected potential hazards that may be encountered for this project. Field activities for this phase are planned to begin in October and continue for approximately 6 months. If changes in site or working conditions occur as the activities progress, Exceltech will provide amendments to this Plan.

Site Description

The Pacific Renaissance Plaza site is located in downtown Oakland, bounded by 9th, Franklin, and Webster Streets and the new East Bay Municipal Utility District Administration Building. The site was acquired by the Redevelopment Agency of the City of Oakland in the late 1970s and was used for several years as a municipal parking lot which serviced the downtown area. A historical evaluation disclosed that a gasoline filling station occupied a portion of the site along Webster Street. A localized zone of hydrocarbon contamination has also been identified adjacent to and extending beneath 10th Street.

Analyses of soil and groundwater samples indicated 8,000 to 10,000 cubic yards of soil containing significant levels of gasoline. As a result of these findings, an in-situ bioremediation project was conducted from March 1989 to June 1990. The goal of this project was to reduce the gasoline levels in the soil to 100 parts per million (ppm) or less. A concentration of 100 ppm is equivalent to .01%, or about 1 quart of gasoline in a 12 cubic yard truckload of soil. In-situ or in place biodegradation involves enhancing the growth of the existing microorganisms in the soil that use gasoline for food. Consumption of the gasoline by the organisms destroys the gasoline molecules.

During the bioremediation project much of the gasoline was decomposed. However, soil analyses from samples collected May 14 through 16, 1990 showed some area of gasoline contamination remains. Soil samples containing gasoline concentration greater than 100 mg/kg (parts per million) and detectable concentrations of benzene, toluene, ethyl benzene, and xylene (BTEX) were found in samples collected from depths of 23 to 30 feet below the surface. The complete table of analytical results is included in Appendix A.

The Pacific Renaissance Plaza soil excavation project will involve the removal and off-site disposal of approximately 130,000 cubic yards of soil as part of a major construction/redevelopment project in downtown Oakland. Virtually the entire city block bordered by Franklin, 10th Street, Webster Street and 9th Street will be excavated to a depth of 40 feet. The entire excavation project will last approximately 6 months and will be conducted in three distinct phases.

In Phase 1 of the excavation, which is scheduled to last 4 to 6 weeks, the site will be cleared of existing surface asphalt and concrete, and the first 8 to 10 feet of soil will be excavated. No gasoline-contaminated soil is expected to be encountered during Phase 1 excavation activities.

In Phase 2 of the excavation, soil between 10 and 30 feet below the surface will be excavated. During this phase of the excavation, there is a potential for exposure of workers to BTEX and gasoline vapors from contaminated soil. During Phase 2 excavation activities the Project Safety Personnel will monitor the soil and the air in the breathing zone of the workers to ensure that organic vapor concentrations do not exceed permissible levels.

In Phase 3, soil between 30 and 40 feet below the surface will be excavated. Based upon the available soil analyses, no gasoline contamination is anticipated below 30 feet. Once this level in the excavation is reached, if soil analyses show no contamination, then soil and breathing air monitoring may be scaled back or discontinued.

All excavations, shoring, and related activities at the site shall be conducted in accordance with Perini's job safety plan and with the monitoring assistance of the Site Supervisor. If, during the course of excavation, shoring, or related activities, soils are suspected by any site worker to be contaminated because of either instrument readings, observations of color or odor, or other indicators, the Site Supervisor shall be notified immediately. Any soil determined by the Site Supervisor to be potentially contaminated will be removed from the excavation and stockpiled in a designated area. Suspect soil shall not be transported in vehicles used to transport clean soils. Perini or its subcontractors shall handle suspect soils in accordance with Perini's job safety plan.

SECTION 2

PROJECT SAFETY AUTHORITY

On-Site Project Safety

The personnel responsible for project safety (hereafter "project safety personnel") are:

Fred Warren, Project Manager, Perini Corporation
Joel Pitto, General Supervisor, Perini Corporation
Site Safety and Health Supervisor, Exceltech (Phase II)
Site Safety and Health Supervisor, Perini Corporation (Phases I and III)

The Project Manager/General Supervisor has overall responsibility and authority to direct all project activities. The Site Safety and Health Supervisor has the responsibility and authority to implement this Site Safety Plan and verify compliance with its provisions. He or she shall be responsible for:

- Safety supplies and equipment inventory.
- Accident/incident reporting procedures.
- Assuring that safety procedures in effect are in compliance with all appropriate federal, state, and company regulations (following the most stringent of the standards);
- Assuring appropriate personal protective equipment is adequate for actual hazards of on-site conditions;
- Assuring appropriate hazard areas are identified and marked; and
- Assuring all personnel entering hazard areas are in appropriate levels of protection.
- Assuring all personnel have respirator training as required by OSHA.
- Interpreting all laboratory analytical results.

SECTION 3

JOB HAZARD ANALYSIS

Chemical Hazards

The organic contaminant of concern on the site is gasoline. (MSDS are attached for regular gasoline, unleaded gasoline, and super unleaded gasoline, as Appendices E-1, E-2, and E-3.) Based upon May 1990 soil analyses, average concentrations of gasoline in the soil are below the limits considered hazardous, but some localized concentrations are high enough to pose safety and health concerns (see Appendix A). Gasoline is a complex mixture of organic compounds, many of which are highly volatile. The chemicals in gasoline of greatest health concern include the aromatic compounds of benzene, toluene, ethyl benzene, and xylene.

Inhalation and skin absorption are the major routes of human exposure to the gasoline compounds that will be encountered in the soil. However, there is no data to show what the breathing zone air concentrations of volatile gasoline compounds will be during the excavation activities. Results of toxicological studies on animal exposure to pure concentrations of the gasoline components that have been detected at the site are detailed in Handbook of Toxic and Hazardous Chemicals, by M. Sitting (1981), and Dangerous Properties of Industrial Materials, by N. Irving Sax (1984). An additional reference source used for the development of this Site Safety Plan is the Documentation of the Threshold Limit Values, published by the American Conference of Governmental Industrial Hygienists. The hazards associated with the compounds of primary interest are summarized in Table 1. "Threshold Limit Values" are recommended exposure limits. "OSHA Permissible Exposure Limits" are legally enforceable standards. For additional information on the physical and chemical properties and the effects of overexposure to all compounds found on-site refer to Appendix B.

Gasoline

Gasoline has an appearance of a clear, aromatic, volatile liquid and is a mixture of alphabetic and aromatic hydrocarbons. The flash point of gasoline is -50 °F, and lower explosive limit is approximately 1.3%. It is highly flammable and its vapor is explosive.

The Threshold Limit Value for gasoline is 300 ppm in air.

Ethyl Benzene

Ethyl benzene is a colorless liquid with an aromatic odor. It has a flash point of at 59 °F and has a Threshold Limit Value of 100 ppm. Ethyl benzene is a flammable liquid.

Table 1

Summary of Important Chemicals and Their Properties

Pacific Reconnaissance Plaza
Soil Excavation Project

Chemical Name	Symptoms of Overexposure	Lower Explosive Limit[1] (% in air)	Upper Explosive Limit[2] (% in air)	Threshold Limit Value[3] (ppm)	OSHA Permissible Exposure Limit[4] (ppm)
Benzene	Irritant to eyes, nose, skin, respiratory system, headaches, nausea, staggered gait, fatigue, abdominal pain; CARCINOGEN	1.3	7.1	1	1
Toluene	Fainting, weakness, confusion, euphoria, dizziness, headache	1.3	7.1	100	100
Ethyl-Benzene	Irritant to eyes, nose, throat, skin and mucous membranes, dizziness, constriction in the chest	1.0	6.7	100	100
Xylene	Dizziness, excitement, drowsiness, incoordination, staggering gait, irritant to eyes, nose, throat, vomiting, abdominal pain.	1.0	6.0	100	100
TPH as Gasoline	Irritant to eyes and lungs, causes cough, conjunctive irritation, hallucinations, dermatitis, blistering, central nervous system depression.	1.3	6.0	300	300

1 Lowest concentration in air that will explode.
2 Highest concentration in air that will explode.
3 Threshold Limit Values recommended by the American Conference of Governmental Industrial Hygienists.
4 Expressed as an 8-hour Time Weighted Average Concentration in air.

Benzene

Benzene, a known human carcinogen, is a common constituent of gasoline and other petroleum products. It is a clear, colorless liquid, with a flash point of 12 °F.

The American Conference of Governmental Industrial Hygienists recommended Threshold Limit Value of 1 ppm has recently been adopted by the State of California as the Permissible Exposure Limit.

Toluene

Toluene is a flammable, colorless liquid, with a benzene-like order. The flash point is 40 °F.

The Threshold Limit Value is 100 ppm in air.

Xylene

Xylene is a clear liquid with a flash point of 100 °F.

The Threshold Limit Value is 100 ppm in air. Xylene is currently under study as a possible carcinogen.

Routes of Exposure

The primary routes of exposure to the gasoline in the soil are inhalation of organic vapors, direct skin contact with contaminated soil, and ingestion of gasoline containing dust. Exposure will be mitigated by air monitoring, the use of protective equipment, and dust control. The air will be monitored by an organic vapor meter whenever the potential exists that the Permissible Exposure Limit for any contaminant may be exceeded.

Heat Stress

Preventing heat stress is particularly important because of potential health effects ranging from transient heat fatigue to serious illness or death. Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and the individual characteristics of the worker. Some signs and symptoms of heat stress include:

- **Heat rash** from continuous exposure to heat or humid air

- **Heat cramps**, caused by heavy sweating with inadequate electrolyte replacement with symptoms such as:

  -- muscle spasms
  -- pain in hands, feet, and abdomen

- **Heat exhaustion** from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration with symptoms such as:

  -- pale, cool, moist skin
  -- heavy sweating
  -- dizziness
  -- nausea
  -- fainting

- **Heat stroke** is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occurs. Competent medical help must be obtained. Signs and symptoms are:

  -- red, hot, usually dry skin
  -- lack of or reduced preparation
  -- nausea
  -- dizziness and confusion
  -- strong, rapid pulse
  -- coma

The following table provides some insight into anticipated weather temperatures:

Table 2

WEATHER TEMPERATURES

Oakland, CA (1989)	Aug.	Sept.	Oct.	Nov.
Mean High Temp	71	70	56	64
Mean Low Temp	55	51	41	48
Highest Temp	82	82	87	76

Physical Hazards

The physical hazards associated with work at the site are those similar to any construction site. Slips, trips, and falls are the most likely accidents, but the use of heavy equipment provides potential for additional serious accidents. The physical hazards associated with this project include: 1) the hazards associated with heavy equipment (primarily physical contact accidents and noise), 2) blowing dust associated with excavating, and 3) fall hazards associated with the excavation pit. Precautions that will be taken to prevent accidents from these physical hazards include:

1. Making sure that all personnel not actually operating heavy equipment stay at least 20 feet away from such equipment while it is operating;

2. Visual monitoring for dust hazards and water application to control dust, where necessary.

3. Physical marking and placement of barriers around the perimeter of the excavation pit.

Acoustical Hazards

Ear protection (foam inserts) is not required for protection against hazardous chemicals; however, use of earmuffs are recommended when noise levels prevent conversation in normal voice at a distance of three feet.

Confined Space Hazards

The Site Safety and Health Supervisor will be alert for confined space hazards. Confined spaces include trenches, pits, sumps, elevator shafts, tunnels or any other areas where circulation of fresh air or the ability to readily escape is restricted.

SECTION 4

RISK ASSESSMENT SUMMARY

The organic vapors that will be released during excavation of contaminated soils at the site pose little risk to the health and safety of the surrounding community and the environment. Soil samples from the site indicate high concentrations of organic compounds confined in isolated areas.

It is anticipated that the concentrations of organic vapors will not reach Permissible Exposure Limits or Threshold Limit Values. The air in the breathing zone within the excavation will be regularly monitored to insure that Permissible Exposure Limits and Threshold Limit Values are not exceeded. If either of these limits for a contaminant are exceeded, appropriate respiratory protective equipment will be provided to field personnel working within the excavation.

The other hazards at the site--temperature, physical, acoustical, dust, and confined spaces--are not expected to be significant if the precautions described above are taken.

SECTION 5

EXPOSURE MONITORING PLAN

Contaminated soil is only expected to be encountered at excavation depths between 10 and 30 feet. As a result, air quality may only be monitored during Phase 2 (10-30 feet). Air quality monitoring shall be implemented to provide baseline and on-going air quality data for site operations. Monitoring shall include:

1. Where there exists the possibility that airborne levels of hazardous substances exceed permissible exposure levels, a preliminary survey of existing air quality conditions. This shall be done to determine the appropriate level of employee protection.

2. Ongoing monitoring of on-site atmospheric contaminant concentrations (including perimeter monitoring of downward air quality conditions) to ensure that employees have the necessary protection.

The Site Safety and Health Supervisor will use a direct reading, photoionization detector and an explosive gas meter in conducting these air monitoring functions. Air monitoring logs will be maintained throughout the project time frame.

VAPOR TESTING LOG

Date	Safety Officer	Time	% LEL or Vapor Level	Comments

SECTION 6

WORKER PROTECTION PROGRAM

Safety/Orientation Training

The following are guidelines for Hazard Communication and Respiratory Protection to protect the health and safety of the Pacific Renaissance Plaza site workers. The purpose of the guidelines is to provide information about potential chemical hazards and the control of those hazards, and the use and care of respirators. Both the Hazard Communication Program and the Respiratory Protection Programs are to be administered at the job site by the Site Safety and Health Supervisor.

Safety Briefing

Before beginning the excavation, the Perini excavation workers will attend a training program covering the project-specific safety issues. In addition, weekly tailgate safety briefings will be conducted to inform workers of any potential hazards which have arisen and instruct workers on any safety procedural changes.

HAZARD COMMUNICATION PROGRAM

Material Safety Data Sheets (MSDS)

MSDS for gasoline will be kept in the site office of the Site Safety and Health Supervisor. The Site Safety and Health Supervisor is responsible for maintaining the MSDS and making the MSDS available to all site workers.

Any new information obtained by the Site Safety and Health Supervisor affecting health and safety at the project site will be passed on to all personnel at the project site.

Employee Information and Training

Prior to starting work, all site workers with any potential for exposure to hazardous substances will be required to attend a health and safety orientation given by the Site Safety and Health Supervisor. A minimum of two hours employee training will be conducted to inform the employees of the on-site hazards, proper protective equipment and work practices to ensure employee safety. Emphasis will be on the route of entry of chemicals into the body. The orientation will:

- Inform employees of hazardous substances and other hazards that may be encountered on the project;

- Describe the physical and health effects of the hazardous substances in the work area;
- Prescribe the methods and observation techniques for determining the presence of hazardous substances in the work area;
- Describe how to lessen or prevent exposure to hazardous substances and minimize risks from other potential hazards;
- Outline steps being taken to lessen or prevent exposure to these substances;
- Describe the emergency and first aid procedures employees should follow if they are exposed to hazardous substance(s); and
- Instruct employees on how to review MSDS to obtain appropriate hazard information.
- Provide instruction on usage of respiratory protective devices (see Respirator Protection Program below) and other personal protective equipment, if necessary
- Instruct employees to carefully read this Site Safety Plan

Respirator Protection Program

The Site Safety and Health Supervisor will be responsible for the implementation, auditing, and enforcement of the Respiratory Protection Program. The Site Safety and Health Supervisor will be responsible for training site workers on the use, maintenance, care and storage of respirators.

Selection

Respirators will be issued by the Site Safety and Health Supervisor. Only respirators approved by the National Institute of Occupational Safety and Health (NIOSH) will be used. The type of respirator suggested for the site is 3M half-mask with organic vapor cartridge.

Respirator Assignment

It is recommended but not mandatory that respirators be assigned to individual employees; individually assigned respirators should be marked with the employee's name.

Respirator Training

Each employee shall be trained before using the respirator on subjects which include: respiratory hazards, respirator types, respirator function, capabilities and limitations of respirators, donning and fit testing, proper use and maintenance. Training will be part of the health and safety orientation provided by the Site Safety and Health Supervisor.

Respirator Fit Testing

Initial fit testing of respirators will be conducted by the Site Safety and Health Supervisor using isoamyl acetate and/or irritant smoke.

Medical Monitoring

A physical designed to evaluate capability to wear respirators will be conducted by a qualified examining physician prior to employees wearing respiratory protection. Typically, these physicals include blood pressure, pulse, medical history, pulmonary function, and auditory evaluation of heart and lungs.

Respirator Cleaning/Sanitization

Respirators will be cleaned after each use. Each employee will be responsible for cleaning his/her respirator. Cleaning will include, at a minimum, washing with warm soapy water, rinsing with clean water, wiping down with alcohol and placing the respirator in a sealed plastic bag. Cleaning will be done at an on-site location designated by the Site Safety and Health Supervisor.

Respiratory Inspection and Maintenance

Respiratory Protection Program effectiveness will be evaluated through regular inspections. Each employee must take his/her respirator to the Site Safety and Health Supervisor for inspection at least once a week. Employees will change cartridges once a day or more often if breakthrough is detected.

Storage of Respirators

When respirators are not in use, they shall be stored in plastic bags, coffee cans, metal boxes, etc., where they will be protected from dust, chemicals, sunlight, and extreme heat, cold, or moisture.

Respiratory Protection Program Records

The following records will be maintained as part of the Respiratory Protection Program:

- A list of the approximate number and types of respirators in use at the site;
- Site-specific Respirator User Approval Forms;
- Medical Evaluation Sheets;
- Respirator inspection and maintenance records.

Table 3

Action Levels

Instrument	Reading	Location	Action
Respiratory Protection[1]			
Organic Vapor Analyzer (OVA)	10 ppm[2]	Breathing Zone	Don Respirator
	100 ppm[2]	Breathing Zone	Leave Area
Explosion Hazard			
Combustible Gas Indicator	20% LEL[3]	Ambient Air	Leave Area

1 Guidelines for Air Monitoring are provided in Section 5.
2 For 5-minute duration.
3 Lower Explosive Limit.

Personal Protective Equipment

Personal protective equipment must be appropriate to protect against the potential hazards at the site. Protective equipment has been selected based on the contaminant types, concentrations, and routes of entry. Where the types of materials and possibilities of contact are unknown and the hazards are not clearly identifiable, a more subjective determination of appropriate personal protective equipment will be made by the Site Safety and Health Supervisor.

Levels of Protection

This is primarily a construction project and only personal protective equipment for construction job safety is expected to be required. However, should contamination protection be required, only personal protective equipment limiting contamination relative to potential routes of exposure is appropriate. That equipment includes (1) shoes or boots with petroleum-resistant soles, (2) gloves, and (3) air-purifying respirator. Generally, these boots and gloves are considered part of Level D protection and the respirator is considered part of Level C protection. The following information is taken from 29 CFR 1910.120:

> **Level D** is a work uniform affording minimal protection, used for nuisance contamination only. As appropriate, Level D equipment includes:
>
> 1. Coveralls
> 2. Gloves*
> 3. Steel-toed, steel-shanked boots*
> 4. Chemically-resistant outer boots*
> 5. Safety glasses or goggles*
> 6. Hard hat
> 7. Escape mask*
> 8. Face shield*
>
> **Level C** is used when concentrations and types of airborne substances are known and criteria for using air purifying respirators are met. As appropriate, Level C equipment includes:
>
> 1. Air-purifying respirator
> 2. Chemical-resistant clothing
> 3. Coveralls*
> 4. Chemical-resistant inner and outer gloves
> 5. Steel-toed, steel-shanked chemical-resistant boots*
> 6. Chemical-resistant outer boots*
> 7. Hard hat
> 8. Escape mask*
> 9. Face shield*
> 10. Two-way radio*

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* Optional

SECTION 7

WORK ZONES AND SECURITY MEASURES

A. General

A site must be controlled to reduce the possibility of exposure to any contaminants present and the possible transport by personnel or equipment from the site.

A control system is required to assure that personnel and equipment working on the hazardous waste site are subjected to appropriate health and safety surveillance.

The possibility of exposure or translocation of contaminants can be reduced or eliminated in a number of ways, including:

- Setting up security or physical barriers to exclude unauthorized individuals from the project site.
- Minimizing the number of personnel and equipment at the site consistent with effective operations.
- Establishing work zones.
- Establishing control points to regulate access to work zones.
- Conducting work operations in such a manner that exposure of personnel and equipment is minimized.
- Minimizing the airborne dispersion of contaminants.
- Implementing the appropriate personnel and equipment decontamination procedures.

B. Field Operations Work Zones

During Phase II, work zones will be established based on anticipated contamination. Within these zones prescribed operations will occur utilizing appropriate personal protective equipment. Movement between areas will be controlled at checkpoints. The planned zones are:

1. Exclusion Zone (contaminated);
2. Contamination Reduction Zone(contaminated); and
3. Support Zone (non-contaminated).

The location of each of these zones will be checked regularly and reset as necessary. In addition, changes such as wind direction may require the immediate re-setting of the zones.

SECTION 8

DECONTAMINATION PROCEDURES

To prevent or reduce the physical transfer of contaminants by personnel and/or equipment, procedures will be followed for decontaminating anything and anybody leaving the Exclusion Zone. Unless otherwise demonstrated, everything and everybody leaving the Exclusion Zone should be considered contaminated and appropriate decontamination methods shall be followed. In general, decontamination will consist of removing soil from boots and tires.

During Phase II, Perini will provide potable water for the washing of hands and face before breaks and before leaving the site at the end of the workday. Should the personal protection levels be upgraded to Level C, all personnel will follow accepted procedures for the decontamination of their air-purifying respirator.

SECTION 9

GENERAL SAFE WORK PRACTICES

During Phase II, the project operations shall be conducted with the following minimum safety practices:

A. Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand to mouth transfer and ingestion of contaminants is prohibited in any area where the possibility of contamination exists. While working in the Contamination Zone, all personnel shall be required to wash hands and face before eating, drinking, or smoking.

B. Hands must be thoroughly washed upon leaving an area that is, or suspected to be, contaminated.

C. Personnel on-site must use the "buddy" system must be maintained when wearing any respiratory protective devices. Continuous communication and visual contact must be maintained between a worker and another member of his work group. A worker should remain in close proximity to other personnel so that assistance can be provided if necessary.

D. Personnel should be cautioned to inform each other if subjective symptoms of chemical exposure are observed, such as headache, dizziness, nausea, and irritation of the respiratory tract.

E. No excessive facial hair interfering with a satisfactory fit of the facepiece-to-face seal will be allowed on personnel required to wear respiratory protective equipment.

F. Selection, use, and maintenance of respiratory protective equipment shall comply with recognized consensus standards (AIHA, ANSI, NIOSH) and the requirements set forth in 29 CFR 1910.134.

G. Appropriate support, contamination reduction, and exclusion zones will be established when appropriate for level of contamination.

H. Personnel on-site are to be thoroughly briefed on the anticipated hazards, equipment requirements, safety practices, emergency procedures and communications methods, initially and in daily briefings. THE EMERGENCY CONTACT LISTING (PAGE 11-4) ALONG WITH THE

ROUTE TO PERALTA HOSPITAL (ROUTE MAP, APPENDIX C) SHOULD BE POSTED IN APPROPRIATE LOCATIONS AT THE SITE.

I. Contact with surface and groundwater shall be avoided.

J. Daily inspections of excavations will be made. If there is evidence of instability, all work in the excavation will cease until the necessary safeguards have been taken.

K. All trenching and excavation work will comply with regulatory agency rules.

L. The walls and spaces of all excavations and trenches more than five feet deep into which employees will enter shall be guarded by shoring, sloping of the ground or other approved means.

M. Oxygen monitoring and other appropriate safeguards will be taken for all work occurring within confined spaces.

N. All trenches will be backfilled as soon as practical after work is completed, and all associated equipment will be removed following receipt of analytical results.

O. Gross decontamination and removal of all personal protective equipment shall be performed prior to leaving the project site.

P. The Site Safety and Health Supervisor must take the necessary steps to remove physical hazards that could lead to falls and tripping accidents. In addition, he or she must make sure that all tools and equipment (including personal protective equipment) are maintained in good repair and are appropriate for the work being performed.

SECTION 10

SANITATION

Perini will provide appropriate sanitary facilities (toilet, potable water, wash basin, etc.,) for project personnel. During Phase II, for the personnel working in the Exclusion Zone and Contamination Reduction Zone, the sanitary facilities will be located within the Contamination Reduction Zone near the border with the Support Zone. Separate facilities will be provided for those personnel working only in the Support Zone.

SECTION 11

EMERGENCY PROCEDURES

A. Site Emergency Warning System

The warning systems that may be utilized depend on the work site conditions. Possibilities include:

1. Verbal communications
2. Vehicle horns
3. Portable hand-held compressed gas horns

Verbal instructions with or without assistance are used to deal with specific incidents.

Vehicle horn signals are used to signify an emergency warning.

One long blast will be used on-site to signify emergency evacuation of the immediate work area to a predetermined upwind location, where a head count will be taken and further instructions given.

Repeated short blasts will be used on-site or from off-site to signify evacuation of all personnel from the site to the hot line, where a head count will be taken and further instructions given.

B. Emergency Equipment

The following equipment comprises the basic emergency equipment list, all of which shall be available at the work site:

1. Fire extinguishers - dry chemical
2. First aid kits (including a chemical burn kit)
3. Combustible gas analyzer (During Phase II)
4. Appropriate spill clean-up supplies and equipment
5. Eye Wash and Safety Shower
6. Telephone

C. General Emergency Procedures

In case of an emergency or hazardous situation, the team member observing this condition shall immediately sound the alarm. The following will then occur:

1. Upon hearing the alarm, all non-emergency communications will cease and the member sounding the alarm will immediately supply the Site Safety and Health Supervisor with all pertinent information.

2. The response action taken will depend on the particular emergency condition.

3. Emergency response organizations (listed below) will be notified immediately.

4. Power equipment will be shut down and operators will stand by for instruction.

5. Injured personnel will be transported into the Support Zone.

6. In the event of a fire, explosion, or hearing the hazard alarm, personnel will immediately proceed to pre-arranged safe locations.

7. Upon arrival at the safe locations, a head count will be taken. The results will be reported to the Project Manager.

8. All personnel will stay at the safe locations until the area is secured.

D. Personal Injury

If an injury occurs, the project safety personnel will be notified and given all appropriate information concerning the nature and cause of the injury so that treatment preparations can be initiated. The injured person will be transported to the Support Area where appropriate first aid and treatment can begin. The injured person will be transported to Peralta Hospital, if necessary. The cause of the injury will be investigated so that necessary changes in work procedures can be implemented.

E. Ambient Monitoring Contingencies

When ambient air monitoring on the downwind edge of the site indicates that contaminant levels are significantly higher than background, the Site Safety and Health Supervisor will immediately determine the cause, make any necessary changes to work practices and site layout (e.g., change the location of the Exclusion Zone), and warn unprotected personnel to evacuate or don protective equipment.

EMERGENCY CONTACT LISTING

Emergency Telephone Numbers:

	Emergency Number	Alternate Number
Fire ..	911	(415) 444-1616
Police	911	(415) 273-3211
Ambulance	911	
San Francisco Poison Control Center		(800) 523-2222
Peralta Hospital 450 30th Street Oakland, California	**(A map showing the route to the hospital is attached as Appendix C).**	(415) 451-4900

Additional Contingency Telephone Number:

Exceltech - Fremont, California	(415) 659-0404

SECTION 12

TRAINING REQUIREMENTS

All personnel who will be within the contaminated or potentially contaminated areas at any time during Phase II of the project (including personnel employed by subcontractors) will attend a project specific safety training conducted by the Site Safety and Health Supervisor before beginning work. Respiratory fit-testing will be included in the training. The training will include classroom and practical application exercises regarding the specific chemical hazards to be expected and the protective equipment to be utilized.

This formal training will be supplemented by weekly tailgate safety meetings and site specific training during Phase II as required. This additional training will also be conducted by the Site Safety and Health Supervisor. As with the formal training, subcontractor personnel will be required to attend the weekly and site-specific training.

SECTION 13

MEDICAL SURVEILLANCE

No medical surveillance will be conducted beyond a physical examination designed to evaluate the capability to wear a respirator, as noted in Section 6.

SECTION 14

RECORDKEEPING

A. General

Recordkeeping shall be consistent with all applicable OSHA regulations. The following permanent records will be maintained both at the Perini offices and at the project site:

1. Safety Inspection Reports
2. Air Monitoring Records (kept in spiral or bound permanent log books)
3. Accident reports
4. Safety Meeting logs

B. Medical Records

Permanent medical records shall be maintained in confidential files by the contract physician/medical clinic. The physician will supply Perini with a medical status document, certifying that the essential personnel assigned to the project during Phase II are physically capable of using respirators.

SECTION 15

SIGNATURES

Site Safety Plan Approved By:

Signature: _____

Name: JEFF WILLETT

Title: MANAGER, ACT

Date: 10/4/90

Signature: _____

Name: _____

Title: _____

Date: _____

Contractor Personnel	Training/Certification/ Medical Examination	Signature	Date

APPENDIX A

CHEMICAL CONTAMINANTS LIST

APPENDIX A
(from "Guidelines for Environmental
Monitoring and Personal Protection"
prepared by Harding Lawson Associates
January 2, 1990)

CHEMICAL CONTAMINANTS:

The contaminants and concentrations presented below are those identified prior to or during site remediation.

Chemical	Environmental Media	Measured Minimum Concentration	Measured Maximum Concentration
Lead	Soil	ND (2 ppm)	2.55 ppm[1]
Benzene	Soil	ND (0.2 ppb)	85,000 ppb[2]
Toluene	Soil	ND (0.2 ppb)	630,000 ppb
Ethylbenzene	Soil	ND (0.2 ppb)	140,000 ppb
Xylenes	Soil	ND (0.2 ppb)	820,000 ppb
1,1-Dichloroethene	Soil	ND (0.5 ppb)	0.8 ppb
Methylene chloride	Soil	ND (0.5 ppb)	550.0 ppb
Chloroform	Soil	ND (0.5 ppb)	7.9 ppb
1,1,1-Trichloroethane	Soil	ND (0.5 ppb)	160.0 ppb
1,2-Dichloroethane	Soil	ND (0.2 ppb)	140.0 ppb
1,2-Dichloropropane	Soil	ND (0.2 ppb)	7.7 ppb
Dibromochloro-methane	Soil	ND (0.2 ppb)	0.6 ppb
Benzene	Water	ND (0.2 ppb)	13,080 ppb
Toluene	Water	ND (0.2 ppb)	61,000 ppb
Ethylbenzene	Water	ND (0.2 ppb)	16,000 ppb
Xylenes	Water	ND (0.2 ppb)	140,000 ppb
Dichloro-difluoromethane	Water	ND (1.0 ppb)	42 ppb
Chloromethane	Water	ND (1.0 ppb)	31 ppb
1,1-Dichloroethene	Water	ND (1.0 ppb)	20 ppb
Methylene chloride	Water	ND (0.5 ppb)	16 ppb
1,1-Dichloroethane	Water	ND (1.0 ppb)	4.1 ppb
Chloroform	Water	ND (0.5 ppb)	6.0 ppb
1,1,1-Trichloroethane	Water	ND (0.5 ppb)	3.5 ppb
1,2-Dichloroethane	Water	ND (1.0 ppb)	130 ppb
Trichloroethene	Water	ND (0.5 ppb)	120 ppb
Tetrachloroethene	Water	ND (0.5 ppb)	1.0 ppb

1 Parts Per Million

2 Parts Per Billion

APPENDIX B

CHEMICAL HAZARDS

APPENDIX B: CHEMICAL HAZARDS

GASOLINE

Gasoline is a variable mixture of straight-chain, branched, cyclic, and aromatic hydrocarbons that usually have 5 to 10 carbon atoms. The flash point for gasoline is 45° F. The lower explosive limit (LEL) is 1.3% (by volume); the upper explosive limit is 6.0%. The specific gravity is 0.75. Gasoline contains small quantities of benzene, toluene, xylene, ethyl benzene, and tetraethyl lead (leaded varieties only), which are individually discussed in the following section.

Hazard Evaluation - Gasoline

Contact with liquid gasoline is irritating to the skin, eyes, and mucous membranes. Dermatitis may result from repeated and prolonged contact with the liquid, which may defat the skin. Certain individuals may develop hypersensitivity.

Gasoline vapor acts as a central nervous system depressant. Exposure to low concentrations may produce flushing of the face, staggering gait, slurred speech, and mental confusion. In high concentrations, gasoline vapor may cause unconsciousness, coma, and possibly death resulting from respiratory failure. Actual exposure may also cause changes in blood chemistry and damage to the pancreas, liver, spleen, and kidneys.

Additional hazards are presented by minor constituents of gasoline including benzene, toluene, xylene, ethyl benzene, and tetraethyl lead. These compounds are discussed separately below.

The threshold limit value (TLV) established by the American Council of Governmental Industrial Hygienists (ACGIH) for gasoline is 300 ppm. Gasoline has a detectable odor at concentrations of 100 ppm or less, indicating good warning properties.

The average concentration of gasoline in the 23-30 feet of contaminated soil layer at the site is only 160 mg gasoline per kilogram soil. The concentration of gasoline in air that will result from volatilization when this soil is excavated is expected to be far below the TLV of 300 ppm by volume in air.

BENZENE, TOLUENE, XYLENE, AND ETHYLBENZENE

Benzene, toluene (methyl benzene), xylene (dimethyl benzene), and ethylbenzene are simple aromatic hydrocarbons that occur in gasoline in small quantities. Gasoline contains approximately 2 to 5% benzene, 6 to 15% toluene, 6 to 20% xylene, and 5% or less ethyl benzene. The physical and chemical properties of the compounds are summarized in Table A below.

Table A. Properties of simple aromatic compounds found at the site

Compound	Mol. Wt.	Boiling Point (•C)	Flash Point (•C)	Vapor Pressure (mm Hg @ STP)	Specific Gravity	Explosive Limit (% by vol.) Lower (LEL)	Upper (UEL)	Solubility (mg/l)
Benzene	78	80	-11	100	0.88	1.3	7.1	1780
Toluene	92	111	4	30	0.87	1.3	7.1	515
Xylene	106	140	29	10	0.87	1.0	6.0	175
Ethylbenzene	106	136	15	9	0.87	1.0	6.7	152

Hazard Evaluation - Benzene

Contact with benzene liquid or vapor may produce primary irritation to the skin and eyes. Reddening of the skin and dry, scaly dermatitis may result from the defatting of the skin. Acute exposure to benzene results in central nervous system depression. Headache, dizziness, nausea, convulsions, coma, and death may result. Death may occur as a result of heart failure. Hemorrhage of the brain, pericardium, urinary tract, mucous membranes, and skin may also occur.

Chronic exposure to benzene is well documented for causing blood and bone marrow changes, including chromosomal aberrations. NIOSH has concluded that chronic benzene exposure can cause leukemia. ACGIH considers benzene a suspected human carcinogen and benzene is listed as a carcinogen under California "Proposition 65."

Benzene has a 24-hour LC_{50} for bluegill sunfish of 20 mg/l; the 24 hour LC_{100} is 34 mg/l. The acute oral LD_{50} for rats is 5600 to 5700 mg/kg body weight. In humans, the onset of symptoms of acute exposure occurs at approximately 500 ppm.

The TLV established by ACGIH for benzene is 10 ppm. The OSHA Permissible Exposure Level (PEL) for benzene is 10 ppm. Benzene has an odor that is detectable by humans at approximately 2 ppm.

The average concentration of benzene in the 23-30 feet contaminated soil layer at the site is less than 0.5 mg benzene per kilogram soil. The concentration of benzene in air that will result from volatilization when this soil is excavated is expected to be far below the PEL of 10 ppm by volume in air.

Hazard Evaluation - Toluene

Contact with toluene may cause irritation of the eyes, respiratory tract, and skin. Repeated or prolonged contact with the liquid may cause the removal of the natural liquids from the skin, resulting in dry, fissured dermatitis.

Acute exposure to toluene predominantly results in central nervous system depression and narcosis. Symptoms include headache, dizziness, fatigue, muscular weakness, drowsiness, loss of coordination, staggering, skin sensations of tingling, burning, or tickling, collapse, and coma.

The 24-hour LC_{50} for goldfish is 58 mg/l. Symptoms of acute exposure appear in humans when exposed to atmospheres containing 300 ppm; severe toxic effects occur at 1000 ppm.

The TLV established by ACGIH for toluene is 100 ppm. It has an odor threshold of approximately 2 ppm, indicating excellent warning properties.

The average concentration of toluene in the 7 - 11 feet contaminated soil layer at the site is about 3 mg toluene per kilogram soil. The concentration of toluene in air that will result from volatilization when this soil is excavated is expected to be far below the TLV of 100 ppm by volume in air.

Hazard Evaluation - Xylene

Xylene vapor may cause irritation of the eyes, nose, and throat. Repeated or prolonged contact with liquid xylene may cause drying and defatting of the skin, with resultant dermatitis.

Acute exposure to xylene vapor may cause central nervous system depression, loss of consciousness, and minor reversible effects on the kidneys and liver. At high concentrations, xylene vapor may cause dizziness, staggering, drowsiness and unconsciousness. At very high concentrations, the vapor may cause pulmonary edema, anorexia, nausea, vomiting, and abdominal pain. Aspiration of liquid xylene may cause lung inflammation, pulmonary edema, and hemorrhage.

The 24-hour LC_{50} for goldfish is 13 to 18 mg/l. Symptoms of acute exposure occur in humans when exposed to 300 ppm; severe effects occur at 1000 ppm.

The TLV established by ACGIH for xylene is 100 ppm. Xylene odors can be detected by humans at concentrations of approximately 0.5 ppm, indicating excellent warning properties.

The average concentration of xylene in the 7 - 11 feet contaminated soil layer at the site is about 14 mg xylene per kilogram soil. The concentration of xylene in air that will result from volatilization when this soil is excavated is expected to be far below the TLV of 100 ppm by volume in air.

Hazard Evaluation - Ethylbenzene

Ethylbenzene liquid and vapor are irritating to the eyes, nose, throat, and skin. Repeated or prolonged contact may produce a dry, scaly, fissured dermatitis.

Acute exposure to high concentrations may produce irritation of the mucous membranes of the upper respiratory tract, nose, and mouth, followed by symptoms of narcosis, cramps, and death due to respiratory center paralysis.

The acute oral LD_{50} for rats is in the range of 3500 mg/l. The TLV established by ACGIH for ethyl benzene is 100 ppm.

The average concentration of ethylbenzene in the 7 - 11 contaminated soil layer at the site is approximately 2 mg ethylbenzene per kilogram soil. The concentrations of ethylbenzene in air that will result from volatilization when the soil is excavated is expected to be far below the TLV of 100 ppm by volume in air.

TETRAETHYL LEAD

Tetraethyl lead ("organic lead") is added to gasoline in small quantities as an anti-knock compound. Tetraethyl lead has a flash point of 200°F and boiling point of 230°F; lower and upper explosive limits are undetermined. The compound has a very low pressure (0.5 mm Hg @ STP). It has a specific gravity of 1.65. Its solubility in water is low, 0.8 mg/l.

Hazard Evaluation - Tetraethyl Lead

Although direct contact is not damaging to the skin itself, tetraethyl lead is readily absorbed through the skin and may irritate the eyes.

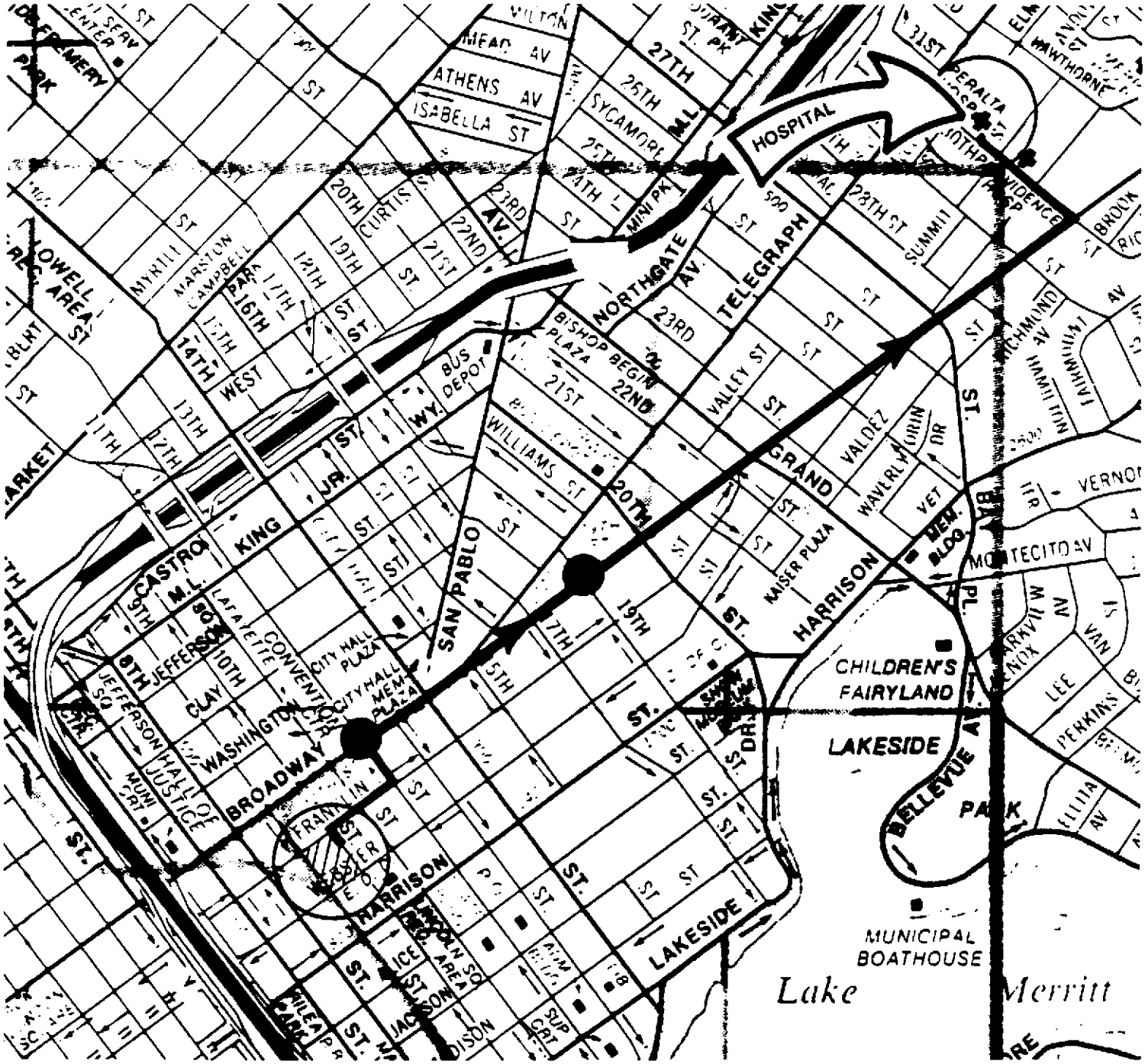
The absorption of a sufficient quantity of tetraethyl lead, whether briefly at a high rate or for more prolonged periods at a slower rate, may cause acute intoxication of the central nervous system. Mild degrees of intoxication cause headache, anxiety, insomnia, nervous excitation, and minor gastrointestinal symptoms, including a metallic taste in the mouth. Tetraethyl lead affects the brain, producing significant clinical symptoms: mild anxiety, toxic delirium with hallucinations, delusions, convulsions, and acute toxic psychosis. Acute exposure can be fatal.

Tetraethyl lead has a 24-hour LC_{50} for bluegill sunfish of 2 ppm (measured as Pb). The oral LD_{50} for rats is 35 mg/kg of body weight.

A TLV of 0.1 mg/m^3 of air has been established by ACGIH for tetraethyl lead. NIOSH has established a permissible exposure limit (PEL) of 0.075 mg/m^3 of air. ACGIH warns that absorption through the skin can be the primary route of exposure.

APPENDIX C

ROUTE TO PERALTA HOSPITAL



LEGEND

SITE LOCATION

EXCELTECH

PERALTA HOSPITAL LOCATION MAP		
PACIFIC RENAISSANCE PLAZA	REVIEWED BY:	APPROVED BY:
OAKLAND, CALIFORNIA	JOB #: 350024-61	DRAWN BY: J.D.S.
	DATE: 9/12/90	DRAWING #:

APPENDIX D

PROJECT PERSONNEL LIST AND SITE SAFETY PLAN DISTRIBUTION RECORD

APPENDIX D

PROJECT PERSONNEL LIST AND SITE SAFETY PLAN DISTRIBUTION RECORD

All personnel working at the project site must sign below, signifying receipt of this safety plan.

Name	Responsibility	Signature and Date

APPENDIX E

E-1, E-2, E-3 MSDS FOR REGULAR GASOLINE, UNLEADED GASOLINE, AND SUPER UNLEADED GASOLINE

Material Safety Data Sheet

Prepared According to the OSHA Hazard Communication Standard (29 CFR 1910.1200).
(Formerly Called MATERIAL INFORMATION BULLETIN)

CHEVRON Unleaded Gasoline

CPS 201110

DANGER! HARMFUL OR FATAL IF SWALLOWED. VAPOR HARMFUL
LONG-TERM EXPOSURE TO VAPOR HAS CAUSED CANCER IN LABORATORY ANIMALS
MAY CAUSE EYE AND SKIN IRRITATION. EXTREMELY FLAMMABLE
KEEP OUT OF REACH OF CHILDREN

TYPICAL COMPOSITION

Blend of paraffins, naphthenes, aromatics and olefins including less than the percentages indicated for the following: 20% toluene (CAS 108-88-3), 20% xylenes (CAS 1330-20-7), 10% methyl tert butyl ether (MTBE) (CAS 1634-04-4), 5% benzene (CAS 71-43-2), 3% n-hexane (CAS 110-54-3), 5% cyclohexane (CAS 110-82-7) and 3% ethyl benzene (CAS 100-41-4)

EXPOSURE STANDARD

The ACGIH (1987-88) TLV for gasoline is 300 ppm for a daily 8-hour exposure. No Federal OSHA exposure standard has been established for this material. The Federal OSHA exposure standard for benzene is 1 ppm for a daily 8-hour exposure with a 15 minute STEL of 5 ppm. The ACGIH (1987-88) TLV is 10 ppm for a daily 8-hour exposure. See Additional Health Data for discussion of benzene exposure limits.

PHYSIOLOGICAL & HEALTH EFFECTS

Eyes

Eye irritation may result from contact with the liquid or exposure to the vapor. The scientific literature warns that vapor concentrations above 500 ppm are irritating.

Skin

Prolonged or frequently repeated liquid contact may cause skin irritation or may cause the skin to become cracked or dry from the defatting action of this material. See Additional Health Data.

Inhalation

Prolonged or repeated breathing of gasoline vapor may be harmful. See Additional Health Data.

Ingestion

This material is expected to be only slightly toxic by ingestion. Note to Physician: See Additional Health Data.

EMERGENCY & FIRST AID PROCEDURES

Eyes

Flush eyes immediately with fresh water for at least 15 minutes while holding the eyelids open. If irritation persists, see a doctor.

Skin

Wash skin thoroughly with soap and water. See a doctor if any signs or symptoms described in this MSDS develop or if any skin irritation occurs. Launder contaminated clothing.

Inhalation

Move exposed person to fresh air. If breathing has stopped, apply artificial respiration. Call a doctor immediately. See Respiratory Protection, Page 2.

Ingestion

If swallowed, DO NOT make person vomit. Call a doctor immediately.

ODDITICNAL HEALTH DATA
See following pages

PI AL PROTECTIVE INFORMATION
ye Protection: Keep away from eyes. Eye o tact can be avoided by wearing arety goggles.
kin Protection: Keep away from skin. Skin o tact can be minimized by wearing m rvious protective clothing including loves.
e piratory Protection: Avoid prolonged r athing of vapor by using approved espiratory protection. Refer to the OSHA enzene Standard to determine what type of e pirator is required based on exposure evels. In open areas, such as outdoor asoline transfer areas, ventilation is is ally adequate to prevent prolonged r athing of high gasoline vapor concentrations. See Additional Health a.
ntilation: Use this material only in ell ventilated areas.
ment: If you experience any of the s ns or symptoms described in this MSDS, ou may be exposed to harmful gasoline evels. Your exposure can be minimized if follow the protective measures esented above.

E PROTECTION
T s product presents an extreme fire azard. Liquid very quickly evaporates, e n at low temperatures, and forms vapor (mes) which can catch fire and burn with explosive violence. Invisible vapor spreads easily and can be set on fire by m y sources such as pilot lights, welding equipment, and electrical motors and switches.
F ash Point: (P-M)<-49°F(-45°C)
A toignition Temp.: NDA
Flammability Limits: 1.4-7.6%
E tinguishing Media: CO_2, Dry Chemical, F am, Water Fog.
Special Fire Fighting Procedures: For f res involving this material, do not e ter any enclosed or confined fire space without proper protective equipment. This may include self-contained breathing a paratus to protect against the hazardous effects of normal products of combustion or ygen deficiency. Read the entire h L.

SPECIAL PRECAUTIONS
See last page of this MSDS.

ENVIRONMENTAL PROTECTION
Environmental Impact: Certain geographical areas have air pollution restrictions concerning the use of materials in work situations which may release volatile components to the atmosphere. Air pollution regulations should be studied to determine if this material is regulated in the area where it is to be used. This material is considered to be a water pollutant and releases of this product should be prevented from contaminating soil and water and from entering drainage and sewer systems.
Precautions if Material is Released or Spilled: Eliminate all sources of ignition in vicinity of spill or released vapor. Clean up small spills using appropriate techniques such as sorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Follow prescribed procedures for reporting and responding to larger releases.
Waste Disposal Methods: Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations. Contact local environmental or health authorities for approved disposal of this material.

REACTIVITY DATA
Stability (Thermal, Light, etc.): Stable
Incompatibility (Materials to Avoid): May react with strong oxidizing materials.
Hazardous Decomposition Products: Normal combustion forms carbon dioxide and water vapor; incomplete combustion can produce carbon monoxide.
Hazardous Polymerization: Will not occur.

PHYSICAL PROPERTIES
Solubility: Soluble in hydrocarbons; insoluble in water.
Appearance (Color, Odor, etc.): Clear to yellow liquid.
Boiling Point: 25-225°C (Range)*
Melting Point: n/a
Specific Gravity: 0.7-0.8 (Range)
Vapor Pressure: 5-15 psi (max) @ 100°F (Range)*
Vapor Density (Air=1): 3-4(Range)
Percent Volatile (Volume %): 99+
Evaporation: NDA
*Variable with season and location.

n/a = Not Applicable
NDA = No Data Available

Material Safety Data Sheet

CHEVRON Unleaded Gasoline CPS 201110

ADDITIONAL HEALTH DATA

Ingestion of gasoline or inhalation of gasoline vapor at airborne concentrations exceeding 1000 ppm may cause signs and symptoms of central nervous system depression such as headache, dizziness, loss of appetite, weakness and loss of coordination. Vapor concentrations in excess of 5000 ppm may cause loss of consciousness, coma and death. Intentional exposures to excessively high concentrations (e.g., when used as a drug of abuse) have been reported to result in clinical manifestations that may include convulsions, delirium, and hallucinations. These manifestations are not known to occur following accidental inhalation of vapor or skin contact with gasolines during normal operations. Brief exposures to high vapor concentrations may also cause pulmonary edema and bronchitis. Note to Physician: Ingestion of this product or subsequent vomiting can result in aspiration of light hydrocarbon liquid which can cause pneumonitis.

This product may contain up to 4.9% benzene. The OSHA Benzene Standard (29 CFR 1910.1028) contains detailed requirements for training, exposure monitoring, respiratory protection and medical surveillance triggered by the exposure level. Refer to the OSHA Standard before using this product. Repeated or prolonged breathing of benzene vapors has been associated with the development of chromosomal damage in experimental animals and various blood diseases in humans ranging from aplastic anemia to leukemia (a form of cancer). All of these diseases can be fatal. Following a two-year cancer bioassay sponsored by the National Toxicology Program, NTP concluded that benzene is a carcinogen for rats and mice of both sexes. In its Monograph Supplement 4, the International Agency for Research on Cancer (IARC) listed benzene in Group 1, chemicals carcinogenic to humans. No teratogenic effects have been shown to occur in pregnant laboratory animals exposed to doses not acutely toxic to the mother. However, some evidence of fetotoxicity such as delayed physical development has been seen at such levels. The available information on the effects of benzene on human pregnancies is inadequate but it has been established that benzene can cross the human placenta. Note: Limiting the total hydrocarbon exposure to 300 ppm, the ACGIH TLV for gasoline, may not keep the benzene concentration below the 1 ppm Federal OSHA exposure standard and ACGIH TLV for benzene.

This product contains n-hexane. Prolonged or repeated contact with n-hexane may produce peripheral neuropathy characterized by progressive weakness and numbness in the extremities, loss of deep tendon reflexes and reduction of motor nerve conduction velocity. Recovery ranges from no recovery to complete recovery depending upon the duration of exposure and the severity of the nerve damage.

This product contains toluene. Toluene has been reported to decrease immunological responses in test animals. It has also been reported that when young rats were exposed to 1000 ppm toluene for 14 hours daily, for two weeks, irreversible hearing loss was detected. The same daily exposure to 700 ppm for as long as 16 weeks was without effect. Since the level necessary to produce hearing loss is greater than 7 times the 1987-88 ACGIH TLV for toluene, worker exposures at or below 100 ppm is not expected to cause any adverse effect. There are also reports that chronic abusers (glue sniffers, solvent huffers) of solvents containing toluene have suffered liver, kidney and brain damage. Scientific studies on toluene have failed to demonstrate teratogenicity in rats and mice. However, toluene has been shown to cause delayed growth and extra ribs in the offspring

rats and mice at inhaled doses (266-399 ppm) that were non-toxic to the mother. Toluene s not conclusively been shown to cause adverse reproductive effects in humans.

This product contains xylene which has been reported to be embryotoxic and to cause developmental disturbances in rats and mice exposed before birth. Xylene has given positive results in several mutagen testing assays including the Ames assay. In a carcinogenicity bioassay sponsored by the National Toxicology Program (NTP), technical grade xylene gave no evidence of carcinogenicity in rats or mice dosed daily for two years.

The American Petroleum Institute (API) sponsored a study where laboratory animals were exposed to 67, 292 and 2056 ppm unleaded gasoline vapor six hours/day, five days/week for approximately two years. Each exposure group consisted of 200 rats and 200 mice. During the course of the study, male rats had an increased incidence of kidney damage followed by repair and enlargement of kidney tubules. At the end of the study, a dose-related incidence of microscopic kidney tumors was detected in the male rats; two tumors were found in the low exposure group, and five were found in the high exposure group. Female rats and both male and female mice did not show this type of lesion. It was noted in the study that the animals that were exposed to gasoline vapors lived longer than the control. Thus, the significance of the tumor findings is difficult to evaluate at this time. Additional findings in the API - sponsored study, which were observed only at the highest doses tested (2065 ppm), included (1) failure to gain body weight, (2) increased incidence of hepatocellular carcinomas (liver cancer) in female mice, and (3) lung inflammation in male and female rats. Subsequent testing has shown that 6 to 10-carbon isoparaffinic compounds in gasoline may be responsible for the early kidney damage observed in male rats in the API study. Information collected by the API and others indicates that the damage occurs only in the male rat, does not occur in female rats or mice and monkeys of either sex and may not occur in man. Although the larger isoparaffins have not been tested, 2,2,4-trimethyl pentane (TMP), an 8-carbon isoparaffinic compound of unleaded gasoline, has been shown to cause kidney damage. A metabolite of TMP has been shown to combine with alpha-2-microglobulin, a protein found only in male rats. The relevance of this reversible binding to the causation of the kidney damage is being studied. How this early kidney injury relates to the development of kidney tumors seen in the API study is currently unknown.

The significance to man of the results of the studies discussed above is not known. While we believe that low level or infrequent exposure to gasoline vapor is not likely to cause cancer or other serious disease, in light of the above information, the precautions outlined in this MSDS should be carefully observed. If strong odor of gasoline is present or if any irritation occurs, individuals should leave the area or institute suitable protective measures (see - Special Protective Information).

SPECIAL PRECAUTIONS

NEVER siphon gasoline by mouth. READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL.

Use only as a motor fuel. Do not use for cleaning, pressure appliance fuel, or any other such use. DO NOT USE OR STORE near flame, sparks or hot surfaces. USE AND STORE ONLY IN COOL, WELL VENTILATED AREA. Keep container closed. DO NOT TRANSFER LIQUID TO AN UNLABELED CONTAINER. DO NOT weld, heat or drill container. Replace cap or bung. Emptied container still contains hazardous or explosive vapor or liquid.

NFPA RATINGS: Health 1; Flammability 3; Reactivity 0.

HMIS Hazard Ratings: Health 2; Flammability 3; Reactivity 0.

This product contains a toxic chemical or chemicals listed below which are 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	CAS #	% Composition
Benzene	71-43-2	1.2-1.4
Methylbenzene (Toluene)	108-88-3	4.3-6.5
Ethylbenzene	100-41-4	0.9-1.4
O-Dimethyl benzene (Xylene)	95-47-6	1.4-2.2
p-Dimethyl benzene (Xylene)	106-42-3	0.7-0.9
m-Dimethyl benzene (Xylene)	108-38-3	3.0-4.6
Cyclohexane (Hexahydrobenzene)	110-82-7	0.5-2.4
Methyl tert-butyl ether	1634-04-4	10.0 Max.

No. 52

Dear Customer: This MSDS contains important environmental, health and toxicology information for your employees who recently ordered this product. Please make sure this information is given to them. If you resell this product, this MSDS should be given to the Buyer. This Form may be reproduced without permission.

Chevron U.S.A. Inc.

Material Safety Data Sheet

Prepared According to the OSHA Hazard Communication Standard (29 CFR 1910.1200).
(Formerly Called MATERIAL INFORMATION BULLETIN)

CHEVRON Regular Gasoline

CPS 201305

DANGER! HARMFUL OR FATAL IF SWALLOWED. VAPOR HARMFUL
LONG-TERM EXPOSURE TO VAPOR HAS CAUSED CANCER IN LABORATORY ANIMALS
MAY CAUSE EYE AND SKIN IRRITATION. EXTREMELY FLAMMABLE
CONTAINS LEAD. KEEP OUT OF REACH OF CHILDREN

TYPICAL COMPOSITION

Blend of paraffins, naphthenes, aromatics and olefins including less than the percentages indicated for the following: 20% toluene (CAS 108-88-3), 20% xylenes (CAS 1330-20-7), 10% methyl tert butyl ether (MTBE) (CAS 1634-04-4), 5% benzene (CAS 71-43-2), 3% n-hexane (CAS 110-54-3), 5% cyclohexane (CAS 110-82-7), 3% ethyl benzene (CAS 100-41-4) and 0.2 g/gal lead (as lead alkyl)

EXPOSURE STANDARD

The ACGIH (1987-88) TLV for gasoline is 300 ppm for a daily 8-hour exposure. No Federal OSHA exposure standard has been established for this material. The Federal OSHA exposure standard for benzene is 1 ppm for a daily 8-hour exposure with a 15 minute STEL of 5 ppm. The ACGIH (1987-88) TLV is 10 ppm for a daily 8-hour exposure. See Additional Health Data for discussion of benzene exposure limits.

PHYSIOLOGICAL & HEALTH EFFECTS	EMERGENCY & FIRST AID PROCEDURES
Eyes	
Eye irritation may result from contact with the liquid or exposure to the vapor. The scientific literature warns that vapor concentrations above 500 ppm are irritating.	Flush eyes immediately with fresh water for at least 15 minutes while holding the eyelids open. If irritation persists, see a doctor.
Skin	
Prolonged or frequently repeated liquid contact may cause skin irritation or may cause the skin to become cracked or dry from the defatting action of this material. See Additional Health Data.	Wash skin thoroughly with soap and water. See a doctor if any signs or symptoms described in this MSDS develop or if any skin irritation occurs. Launder contaminated clothing.
Inhalation	
Prolonged or repeated breathing of gasoline vapor may be harmful. See Additional Health Data.	Move exposed person to fresh air. If breathing has stopped, apply artificial respiration. Call a doctor immediately. See Respiratory Protection, Page 2.
Ingestion	
This material is expected to be only slightly toxic by ingestion. Note to Physician: See Additional Health Data.	If swallowed, DO NOT make person vomit. Call a doctor immediately.

OD :IONAL HEALTH DATA
(: following pages

PE IAL PROTECTIVE INFORMATION
ye Protection: Keep away from eyes. Eye ontact can be avoided by wearing chemical af-ty goggles.
ki Protection: Keep away from skin. Skin ontact can be minimized by wearing mpervious protective clothing including li 'es.
e.piratory Protection: Avoid prolonged reathing of vapor by using approved e piratory protection. Refer to the OSHA e zene Standard to determine what type of espirator is required based on exposure e''els. In open areas, such as outdoor ga oline transfer areas, ventilation is usually adequate to prevent prolonged br-eathing of high gasoline vapor co centrations. See Additional Health Data.
Ventilation: Use this material only in w .l ventilated areas.
C ment: If you experience any of the signs or symptoms described in this MSDS, y may be exposed to harmful gasoline l .s. Your exposure can be minimized if you follow the protective measures presented above.

FIRE PROTECTION
This product presents an extreme fire h zard. Liquid very quickly evaporates, even at low temperatures, and forms vapor (fumes) which can catch fire and burn with xplosive violence. Invisible vapor preads easily and can be set on fire by many sources such as pilot lights, welding -quipment, and electrical motors and witches.
Flash Point: (P-M)<-49°F(-45°C)
Autoignition Temp.: NDA
lammability Limits: 1.4-7.6%
Extinguishing Media: CO_2, Dry Chemical, Foam, Water Fog.
pecial Fire Fighting Procedures: For ires involving this material, do not enter any enclosed or confined fire space without proper protective equipment. This may include self-contained breathing apparatus to protect against the hazardous e cts of normal products of combustion or oxygen deficiency. Read the entire MSDS.

SPECIAL PRECAUTIONS
See last page of this MSDS.

ENVIRONMENTAL PROTECTION
Environmental Impact: Certain geographical areas have air pollution restrictions concerning the use of materials in work situations which may release volatile components to the atmosphere. Air pollution regulations should be studied to determine if this material is regulated in the area where it is to be used. This material is considered to be a water pollutant and releases of this product should be prevented from contaminating soil and water and from entering drainage and sewer systems.
Precautions if Material is Released or Spilled: Eliminate all sources of ignition in vicinity of spill or released vapor. Clean up small spills using appropriate techniques such as sorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Follow prescribed procedures for reporting and responding to larger releases.
Waste Disposal Methods: Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations. Contact local environmental or health authorities for approved disposal of this material.

REACTIVITY DATA
Stability (Thermal, Light, etc.): Stable.
Incompatibility (Materials to Avoid): May react with strong oxidizing materials.
Hazardous Decomposition Products: Normal combustion forms carbon dioxide and water vapor; incomplete combustion can produce carbon monoxide.
Hazardous Polymerization: Will not occur.

PHYSICAL PROPERTIES
Solubility: Soluble in hydrocarbons; insoluble in water.
Appearance (Color, Odor, etc.): Orange to bronze liquid.
Boiling Point: 25-225°C (Range)*
Melting Point: n/a
Specific Gravity: 0.7-0.8 (Range)
Vapor Pressure: 5-15 psi (max.) @ 100°F (Range)*
Vapor Density (Air=1): 3-4(Range)
Percent Volatile (Volume %): 99+
Evaporation: NDA
*Variable with season and location.

n/a = Not Applicable
NDA = No Data Available

The above information is based on data of which we are aware and is believed to be correct as of the date hereof. Since the information contained ...

Material Safety Data Sheet

CPS 201305

CHEVRON Regular Gasoline

DDITIONAL HEALTH DATA

Ingestion of gasoline or inhalation of gasoline vapor at airborne concentrations exceeding .000 ppm may cause signs and symptoms of central nervous system depression such as headache, dizziness, loss of appetite, weakness and loss of coordination. Vapor concentrations in excess of 5000 ppm may cause loss of consciousness, coma and death. Intentional exposures to excessively high concentrations (e.g., when used as a drug of abuse) have been reported to result in clinical manifestations that may include convulsions, delirium, and hallucinations. These manifestations are not known to occur following accidental inhalation of vapor or skin contact with gasolines during normal operations. Brief exposures to high vapor concentrations may also cause pulmonary edema and bronchitis. Note to Physician: Ingestion of this product or subsequent vomiting can result in aspiration of light hydrocarbon liquid which can cause pneumonitis.

This product may contain up to 4.9% benzene. The OSHA Benzene Standard (29 CFR 1910.1028) contains detailed requirements for training, exposure monitoring, respiratory protection d medical surveillance triggered by the exposure level. Refer to the OSHA Standard efore using this product. Repeated or prolonged breathing of benzene vapors has been associated with the development of chromosomal damage in experimental animals and various blood diseases in humans ranging from aplastic anemia to leukemia (a form of cancer). All of these diseases can be fatal. Following a two-year cancer bioassay sponsored by the National Toxicology Program, NTP concluded that benzene is a carcinogen for rats and mice of both sexes. In its Monograph Supplement 4, the International Agency for Research on Cancer (IARC) listed benzene in Group 1, chemicals carcinogenic to humans. No teratogenic effects have been shown to occur in pregnant laboratory animals exposed to doses not acutely toxic to the mother. However, some evidence of fetotoxicity such as delayed physical development has been seen at such levels. The available information on the effects of benzene on human pregnancies is inadequate but it has been established that benzene can cross the human placenta.Note: Limiting the total hydrocarbon exposure to 300 ppm, the ACGIH TLV for gasoline, may not keep the benzene concentration below the 1 ppm Federal OSHA exposure standard and ACGIH TLV for benzene.

This product contains n-hexane. Prolonged or repeated contact with n-hexane may produce peripheral neuropathy characterized by progressive weakness and numbness in the extremities, loss of deep tendon reflexes and reduction of motor nerve conduction velocity. Recovery ranges from no recovery to complete recovery depending upon the duration of exposure and the severity of the nerve damage.

This product contains toluene. Toluene has been reported to decrease immunological responses in test animals. It has also been reported that when young rats were exposed to 1000 ppm toluene for 14 hours daily, for two weeks, irreversible hearing loss was detected. The same daily exposure to 700 ppm for as long as 16 weeks was without effect. Since the level necessary to produce hearing loss is greater than 7 times the 1987-88 ACGIH TLV for toluene, worker exposures at or below 100 ppm is not expected to cause any adverse effect. There are also reports that chronic abusers (glue sniffers, solvent huffers) of solvents containing toluene have suffered liver, kidney and brain damage. Scientific studies on toluene have failed to demonstrate teratogenicity in rats and mice. However, toluene has been shown to cause delayed growth and extra ribs in the offspring

or rats and mice at inhaled doses (266-399 ppm) that were non-toxic to the mother. Toluene has not conclusively been shown to cause adverse reproductive effects in humans.

s product contains xylene which has been reported to be embryotoxic and to cause developmental disturbances in rats and mice exposed before birth. Xylene has given egative results in several mutagen testing assays including the Ames assay. In a arcinogenicity bioassay sponsored by the National Toxicology Program (NTP), technical grade xylene gave no evidence of carcinogenicity in rats or mice dosed daily for two years.

The American Petroleum Institute (API) sponsored a study where laboratory animals were exposed to 67, 292 and 2056 ppm unleaded gasoline vapor six hours/day, five days/week for pproximately two years. Each exposure group consisted of 200 rats and 200 mice. During he course of the study, male rats had an increased incidence of kidney damage followed by repair and enlargement of kidney tubules. At the end of the study, a dose-related ncidence of microscopic kidney tumors was detected in the male rats; two tumors were ound in the low exposure group, and five were found in the high exposure group. Female rats and both male and female mice did not show this type of lesion. It was noted in the study that the animals that were exposed to gasoline vapors lived longer than the control. Thus, the significance of the tumor findings is difficult to evaluate at this time. Additional findings in the API - sponsored study, which were observed only at the highest does tested (2065 ppm), included (1) failure to gain body weight, (2) increased incidence of hepatocellular carcinomas (liver cancer) in female mice, and (3) lung inflammation in male and female rats. Subsequent testing has shown that 6 to 10-carbon isoparaffinic compounds in gasoline may be responsible for the early kidney damage observed in male rats in the API study. Information collected by the API and others indicates that the damage occurs only in the male rat, does not occur in female rats or mice and monkeys of either sex and may not occur in man. Although the larger isoparaffins have not been tested, 2,4-trimethyl pentane (TMP), an 8-carbon isoparaffinic compound of unleaded gasoline, been shown to cause kidney damage. A metabolite of TMP has been shown to combine with alpha-2-microglobulin, a protein found only in male rats. The relevance of this reversible binding to the causation of the kidney damage is being studied. How this early kidney injury relates to the development of kidney tumors seen in the API study is currently unknown.

The significance to man of the results of the studies discussed above is not known. While we believe that low level or infrequent exposure to gasoline vapor is not likely to cause cancer or other serious disease, in light of the above information, the precautions outlined in this MSDS should be carefully observed. If strong odor of gasoline is present or if any irritation occurs, individuals should leave the area or institute suitable protective measures (see - Special Protective Information).

SPECIAL PRECAUTIONS

NEVER siphon gasoline by mouth. READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL.

Use only as a motor fuel. Do not use for cleaning, pressure appliance fuel, or any other such use. DO NOT USE OR STORE near flame, sparks or hot surfaces. USE AND STORE ONLY IN COOL, WELL VENTILATED AREA. Keep container closed. DO NOT TRANSFER LIQUID TO AN UNLABELED CONTAINER. DO NOT weld, heat or drill container. Replace cap or bung. Emptied container still contains hazardous or explosive vapor or liquid.

NFPA RATINGS: Health 1; Flammability 3; Reactivity 0.

S Hazard Ratings: Health 2; Flammability 3; Reactivity 0.

This product contains a toxic chemical or chemicals listed below which are 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	CAS #	% Composition
Benzene	71-43-2	1.2-1.4
Methylbenzene (Toluene)	108-88-3	4.3-6.5
Ethylbenzene	100-41-4	0.9-1.4
O-Dimethyl benzene (Xylene)	95-47-6	1.4-2.2
p-Dimethyl benzene (Xylene)	106-42-3	0.7-0.9
m-Dimethyl benzene (Xylene)	108-38-3	3.0-4.6
Cyclohexane (Hexahydrobenzene)	110-82-7	0.5-2.4
Methyl tert-butyl ether	1634-04-4	10.0 Max.

No.54

Shell

MATERIAL SAFETY DATA SHEET

MSDS NUMBER ▶ 51.161-9 PAGE 1

97367 14-85

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

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

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

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

SECTION I

	NAME
PRODUCT ▶	SU 2000(R) (SUPER UNLEADED GASOLINE)
CHEMICAL NAME ▶	PETROL
CHEMICAL FAMILY ▶	HYDROCARBON
SHELL CODE ▶	04352

SECTION II-A — PRODUCT/INGREDIENT COMPOSITION

NO.		CAS NUMBER	PERCENT
P	SU 2000 (SUPER UNLEADED GASOLINE)	MIXTURE	100
1	ALKANES, CYCLOALKANES, ALKENES AND AROMATIC HYDROCARBONS	MIXTURE	BALANCE
2	TOLUENE	108-88-3	0-25
3	XYLENE	1330-20-7	0-25
4	BENZENE	71-43-2	0-5
5	N-HEXANE	110-54-3	0-3
6	TERT-BUTYL METHYL ETHER	1634-04-4	0-11

SECTION II-B — ACUTE TOXICITY DATA

NO.	ACUTE ORAL LD50	ACUTE DERMAL LD50	ACUTE INHALATION LC50
P	>5 GM/KG (RAT)	>2 GM/KG (RABBIT)	>5 MG/L/4HR (RAT)

SECTION III — HEALTH INFORMATION

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

EYE CONTACT
BASED ON PRODUCT TESTING PRODUCT IS MINIMALLY IRRITATING TO THE EYES.

SKIN CONTACT
PROLONGED AND REPEATED LIQUID CONTACT CAN CAUSE DEFATTING AND DRYING OF THE SKIN RESULTING IN SKIN IRRITATION AND DERMATITIS.

INHALATION
THIS PRODUCT MAY CAUSE IRRITATION TO THE NOSE, THROAT AND RESPIRATORY TRACT AND ADDITIONALLY, MAY PRODUCE LIVER AND KIDNEY DAMAGE. HIGH VAPOR CONCENTRATIONS MAY PRODUCE CNS DEPRESSION.

INGESTION
THIS PRODUCT MAY BE HARMFUL OR FATAL IF SWALLOWED. INGESTION OF PRODUCT MAY RESULT IN VOMITING; ASPIRATION (BREATHING) OF VOMITUS INTO THE LUNGS MUST BE AVOIDED AS EVEN SMALL QUANTITIES MAY

RESULT IN ASPIRATION PNEUMONITIS.

SIGNS AND SYMPTOMS
IRRITATION AS NOTED ABOVE. EARLY TO MODERATE CNS (CENTRAL NERVOUS SYSTEM) DEPRESSION MAY BE EVIDENCED BY GIDDINESS, HEADACHE, DIZZINESS AND NAUSEA; IN EXTREME CASES, UNCONCIOUSNESS AND DEATH MAY OCCUR. ASPIRATION PNEUMONITIS MAY BE EVIDENCED BY COUGHING, LABORED BREATHING AND CYANOSIS (BLUISH SKIN); IN SEVERE CASES DEATH MAY OCCUR. KIDNEY DAMAGE MAY BE EVIDENCED BY CHANGES IN URINE OUTPUT, URINE APPEARANCE OR EDEMA (SWELLING FROM FLUID RETENTION). LIVER DAMAGE MAY BE EVIDENCED BY LOSS OF APPETITE, JAUNDICE (YELLOWISH SKIN COLOR) AND SOMETIMES PAIN IN THE UPPER ABDOMEN ON THE RIGHT SIDE.

AGGRAVATED MEDICAL CONDITIONS
PREEXISTING EYE, SKIN, AND RESPIRATORY DISORDERS MAY BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT. IMPAIRED LIVER AND KIDNEY FUNCTION(S) FROM PREEXISTING DISORDERS MAY BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT.

OTHER HEALTH EFFECTS
IT HAS BEEN REPORTED THAT CHRONIC INHALATION EXPOSURE TO AN UNLEADED MOTOR GASOLINE, WHICH WAS FULLY VAPORIZED, HAS PRODUCED KIDNEY AND LIVER CANCERS IN SOME LABORATORY RODENTS. THE STUDIES WERE SPONSORED BY THE AMERICAN PETROLEUM INSTITUTE. THE API TEST MATERIAL USED WAS BLENDED TO REPRESENT A TYPICAL UNLEADED MOTOR GASOLINE. BENZENE IS LISTED BY THE NATIONAL TOXICOLOGY PROGRAM, THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER, AND OSHA AS A CHEMICAL CAUSALLY ASSOCIATED WITH CANCER IN HUMANS.

SEE SECTION VI FOR SUPPLEMENTAL INFORMATION.

SECTION IV — OCCUPATIONAL EXPOSURE LIMITS

NO.	OSHA PEL/TWA	OSHA PEL/CEILING	ACGIH TLV/TWA	ACGIH TLV/STEL	OTHER
P 4	1 PPM	5 PPM*	300 PPM 10 PPM**	500 PPM	

*15 MINUTE STEL; **CLASSIFIED BY ACGIH AS A "SUSPECTED HUMAN CARCINOGEN" (A2)

SECTION V — EMERGENCY AND FIRST AID PROCEDURES

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

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

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

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

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

SECTION VI — SUPPLEMENTAL HEALTH INFORMATION

INFORMATION ON PRODUCT:

A CHRONIC INHALATION STUDY (REFERENCED IN SECTION III) SUPPORTED BY THE AMERICAN PETROLEUM INSTITUTE FOUND THAT FULLY VAPORIZED UNLEADED GASOLINE EXPOSURE PRODUCED DOSE-RELATED INCIDENCES OF KIDNEY CANCER IN MALE RATS. GASOLINE EXPOSURE ALSO PRODUCED AN INCREASE OF LIVER CANCER AT THE HIGHEST DOSE (2056 PPM) IN FEMALE MICE. EXPOSURES WERE FOR 6 HRS/DAY, 5 DAYS/WEEK FOR A TOTAL OF

27 MONTHS. THE RELATIONSHIP AND SIGNIFICANCE TO MAN OF THE RESULTS OF THIS STUDY ARE NOT KNOWN.

INHALATION STUDIES ON GASOLINE VAPORS HAVE CAUSED CENTRAL NERVOUS SYSTEM EFFECTS IN DOGS AT 10,000 PPM.

UNLEADED GASOLINE WAS EVALUATED FOR GENETIC ACTIVITY IN ASSAYS USING MICROBIAL CELLS, CULTURED MAMMALIAN CELLS AND RATS (BONE MARROW). THE RESULTS WERE ALL NEGATIVE. UNLEADED GASOLINE WAS CONSIDERED NON-MUTAGENIC UNDER THESE CONDITIONS.

INFORMATION ON GASOLINE CONSTITUENTS:

LABORATORY ANIMALS EXPOSED BY VARIOUS ROUTES TO HIGH DOSES OF XYLENE SHOWED EVIDENCE OF EFFECTS IN THE LIVER, KIDNEYS, LUNGS, SPLEEN, HEART AND ADRENALS. RATS EXPOSED TO XYLENE VAPOR DURING PREGNANCY SHOWED EMBRYO/FETOTOXIC EFFECTS. MICE EXPOSED ORALLY TO DOSES PRODUCING MATERNAL TOXICITY ALSO SHOWED EMBRYO/FETOTOXIC EFFECTS. LABORATORY RATS EXPOSED TO HIGH CONCENTRATIONS OF XYLENE EXPERIENCED RECORDABLE HEARING LOSS.

WHILE THERE IS NO EVIDENCE THAT INDUSTRIALLY ACCEPTABLE LEVELS OF TOLUENE VAPORS (E.G., THE TLV) HAVE PRODUCED CARDIAC EFFECTS IN HUMANS, ANIMAL STUDIES HAVE SHOWN THAT INHALATION OF HIGH LEVELS OF TOLUENE PRODUCED CARDIAC SENSITIZATION. SUCH SENSITIZATION MAY CAUSE FATAL CHANGES IN HEART RHYTHMS. THIS LATTER EFFECT WAS SHOWN TO BE ENHANCED BY HYPOXIA OR THE INJECTION OF ADRENALIN-LIKE AGENTS. LABORATORY RATS EXPOSED TO HIGH CONCENTRATIONS OF TOLUENE EXPERIENCED RECORDABLE HEARING LOSS.

PROLONGED AND REPEATED BENZENE EXPOSURE MAY CAUSE SERIOUS INJURY TO BLOOD FORMING ORGANS; BENZENE IS SUSPECTED OF CARCINOGENIC (LEUKEMIA) POTENTIAL IN MAN. ANIMAL STUDIES ON BENZENE HAVE DEMONSTRATED IMMUNOTOXICITY, TESTICULAR EFFECTS AND ALTERATIONS IN REPRODUCTIVE CYCLES, EVIDENCE OF CHROMOSOMAL DAMAGE OR OTHER CHROMOSOMAL CHANGES, AND EMBRYO/FETOTOXICITY BUT NOT TERATOGENICITY.

PROLONGED AND REPEATED EXPOSURE TO N-HEXANE MAY PRODUCE PERIPHERAL AND CENTRAL NERVE DAMAGE. STUDIES ON N-HEXANE IN LABORATORY ANIMALS HAVE SHOWN MILD, TRANSITORY EFFECTS ON THE SPLEEN AND BLOOD (WHITE BLOOD CELLS), AND EVIDENCE OF LUNG DAMAGE. IN ADDITION, FETOTOXICITY HAS BEEN DEMONSTRATED AT LEVELS PRODUCING MATERNAL TOXICITY. AT HIGH LEVELS, INHALATION EXPOSURE HAS RESULTED IN TESTICULAR AND EPIDIDYMAL ATROPHY.

THE HANDLING PROCEDURES AND SAFETY PRECAUTIONS IN THIS MSDS SHOULD BE FOLLOWED TO MINIMIZE EMPLOYEE EXPOSURE.

SECTION VII PHYSICAL DATA

BOILING POINT: 100-425 APPROX. (DEG F)

SPECIFIC GRAVITY: 0.72-0.76 (H2O=1)

VAPOR PRESSURE: 7-14.5 PSI (MM HG) (REID)

MELTING POINT: NOT AVAILABLE (DEG F)

SOLUBILITY: NEGLIGIBLE (IN WATER)

VAPOR DENSITY: 3.5 (AIR=1)

EVAPORATION RATE (N-BUTYL ACETATE = 1): NOT AVAILABLE

% VOLATILE BY VOL* 100 (@ 415 DEG. F)

APPEARANCE AND ODOR:
RED COLOR; CLEAR AND BRIGHT LIQUID. HYDROCARBON ODOR.

SECTION VIII FIRE AND EXPLOSION HAZARDS

FLASH POINT AND METHOD:
-40 DEG F TAG CLOSED TESTER

FLAMMABLE LIMITS /% VOLUME IN AIR
LOWER: 1.3 UPPER: 7.6

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

SPECIAL FIRE FIGHTING PROCEDURES AND PRECAUTIONS
DANGER. EXTREMELY FLAMMABLE. CLEAR FIRE AREA OF UNPROTECTED PERSONNEL AND ISOLATE. DO NOT ENTER CONFINED FIRE SPACE WITHOUT FULL BUNKER GEAR INCLUDING A POSITIVE PRESSURE NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER.

UNUSUAL FIRE AND EXPLOSION HAZARDS
VAPORS ARE HEAVIER THAN AIR ACCUMULATING IN LOW AREAS AND TRAVELING ALONG THE GROUND AWAY FROM THE HANDLING SITE. DO NOT WELD, HEAT OR DRILL ON OR NEAR CONTAINER; HOWEVER, IF EMERGENCY SITUATIONS REQUIRE DRILLING, ONLY TRAINED EMERGENCY PERSONNEL SHOULD DRILL.

SECTION IX REACTIVITY

STABILITY: STABLE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS AND MATERIALS TO AVOID:
AVOID HEAT, SPARKS, OPEN FLAMES AND STRONG OXIDIZING AGENTS. PREVENT VAPOR ACCUMULATION.

HAZARDOUS DECOMPOSITION PRODUCTS
CARBON MONOXIDE AND OTHER UNIDENTIFIED ORGANIC COMPOUNDS CAN BE FORMED UPON COMBUSTION.

SECTION X EMPLOYEE PROTECTION

RESPIRATORY PROTECTION
UNDER CONDITIONS OF POTENTIAL HIGH EXPOSURE, THE USE OF A NIOSH-APPROVED RESPIRATOR IS RECOMMENDED. PER 29 CFR 1910.134 OR 29 CFR 1910.1028 USE EITHER AN ATMOSPHERE-SUPPLYING RESPIRATOR OR AN AIR-PURIFYING RESPIRATOR FOR ORGANIC VAPORS. FOR SERVICE STATION PERSONNEL PROTECTION, SEE SECTION XII.

PROTECTIVE CLOTHING
AVOID CONTACT WITH EYES. WEAR CHEMICAL GOGGLES IF THERE IS LIKELIHOOD OF CONTACT WITH EYES. TEST DATA FROM PUBLISHED LITERATURE AND/OR GLOVE AND CLOTHING MANUFACTURERS INDICATE THE BEST PROTECTION IS PROVIDED BY NITRILE RUBBER, POLYVINYL ALCOHOL OR VITON/NEOPRENE.

ADDITIONAL PROTECTIVE MEASURES
USE EXPLOSION-PROOF VENTILATION AS REQUIRED TO CONTROL VAPOR CONCENTRATIONS.

SECTION XI ENVIRONMENTAL PROTECTION

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

SECTION XII SPECIAL PRECAUTIONS

DANGER. EXTREMELY FLAMMABLE. AVOID HEAT, SPARKS, OPEN FLAMES, INCLUDING PILOT LIGHTS, AND STRONG OXIDIZING AGENTS. USE EXPLOSION-PROOF VENTILATION TO PREVENT VAPOR ACCUMULATION. ALL HANDLING EQUIPMENT MUST BE GROUNDED TO PREVENT SPARKING. HARMFUL OR FATAL IF SWALLOWED. DO NOT SIPHON GASOLINE BY MOUTH.

FOR USE AS A MOTOR FUEL ONLY. DO NOT USE AS A CLEANING SOLVENT OR FOR OTHER NON-MOTOR FUEL USES. WASH WITH SOAP AND WATER BEFORE EATING, DRINKING, SMOKING OR USING TOILET FACILITIES. LAUNDER CONTAMINATED CLOTHING BEFORE REUSE. UNDER NORMAL WORKING CONDITIONS AT SERVICE STATIONS, A RESPIRATOR IS NOT WARRANTED.

IF A MAJOR SPILL OCCURS, GET UPWIND AND NOTIFY LOCAL EMERGENCY PERSONNEL. REMEMBER EXPLOSION AND FIRE IS THE MOST IMMEDIATE DANGER.

SECTION XIII TRANSPORTATION REQUIREMENTS

DEPARTMENT OF TRANSPORTATION CLASSIFICATION:
FLAMMABLE LIQUID

D.O.T. PROPER SHIPPING NAME:
GASOLINE

OTHER REQUIREMENTS:
D.O.T. I.D. #UN 1203, GUIDE NO. 27.

SECTION XIV OTHER REGULATORY CONTROLS

THE COMPONENTS OF THIS PRODUCT ARE LISTED ON THE EPA/TSCA INVENTORY OF CHEMICAL SUBSTANCES. COMPONENT 6 IS THE SUBJECT OF A TSCA SECTION 4 TEST RULE. EXPORT OF THIS PRODUCT IS THEREFORE PROHIBITED WITHOUT NOTIFICATION TO EPA.

SECTION XV SPECIAL NOTES

SECTION XI - ENVIRONMENTAL PROTECTION HAS BEEN REVISED. THE INFORMATION IN THE "WASTE DISPOSAL" AND "ENVIRONMENT PROTECTION" HAS BEEN REMOVED AND INCLUDED IN THE ATTACHED ENVIRONMENTAL DATA SHEET. IN ACCORDANCE WITH SARA TITLE III, SECTION 313, THE EDS SHOULD ALWAYS BE COPIED AND SENT WITH THE MSDS. THE MTBE CONTENT HAS BEEN INCREASED IN THIS REVISION.

DATE PREPARED: FEBRUARY 02, 1989

J. C. WILLETT

BE SAFE

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

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

ENVIRONMENTAL DATA SHEET

Shell

EDS NUMBER ▶ 51,161-1 PAGE 1

97449 (9-87)

PRODUCT ▶ SU 2000(R) (SUPER UNLEADED GASOLINE)

PRODUCT CODE ▶ 04352

SECTION I PRODUCT/COMPOSITION

NO.	COMPONENT	CAS NUMBER	PERCENT
P	SU 2000 (SUPER UNLEADED GASOLINE)	MIXTURE	100
1	ALKANES, CYCLOALKANES, ALKENES AND AROMATIC HYDROCARBONS	MIXTURE	BALANCE
2	TOLUENE	108-88-3	0-25
3	XYLENE	1330-20-7	0-25
4	BENZENE	71-43-2	0-5
5	N-HEXANE	110-54-3	0-3
6	TERT-BUTYL METHYL ETHER	1634-04-4	0-5
7	PSEUDOCUMENE (1,2,4-TRIMETHYLBENZENE)	95-63-3	0-1
8	CYCLOHEXANE	110-82-7	0-3
9	ETHYLBENZENE	100-41-4	0-1
10	NAPHTHALENE	91-20-3	

SECTION II SARA TITLE III INFORMATION

NO.	EHS RQ (LBS) (*1)	EHS TPQ (LBS) (*2)	SEC 313 (*3)	313 CATEGORY (*4)	311/312 CATEGORIES (*5)
P					H-1, H-2, P-3
2			YES		
3			YES		
4			YES		
6			YES		
7			YES		
8			YES		
9			YES		
10			YES		

FOOTNOTES

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

SECTION III CERCLA INFORMATION

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

SECTION IV RCRA INFORMATION

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

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

DATE PREPARED: MARCH 10, 1989

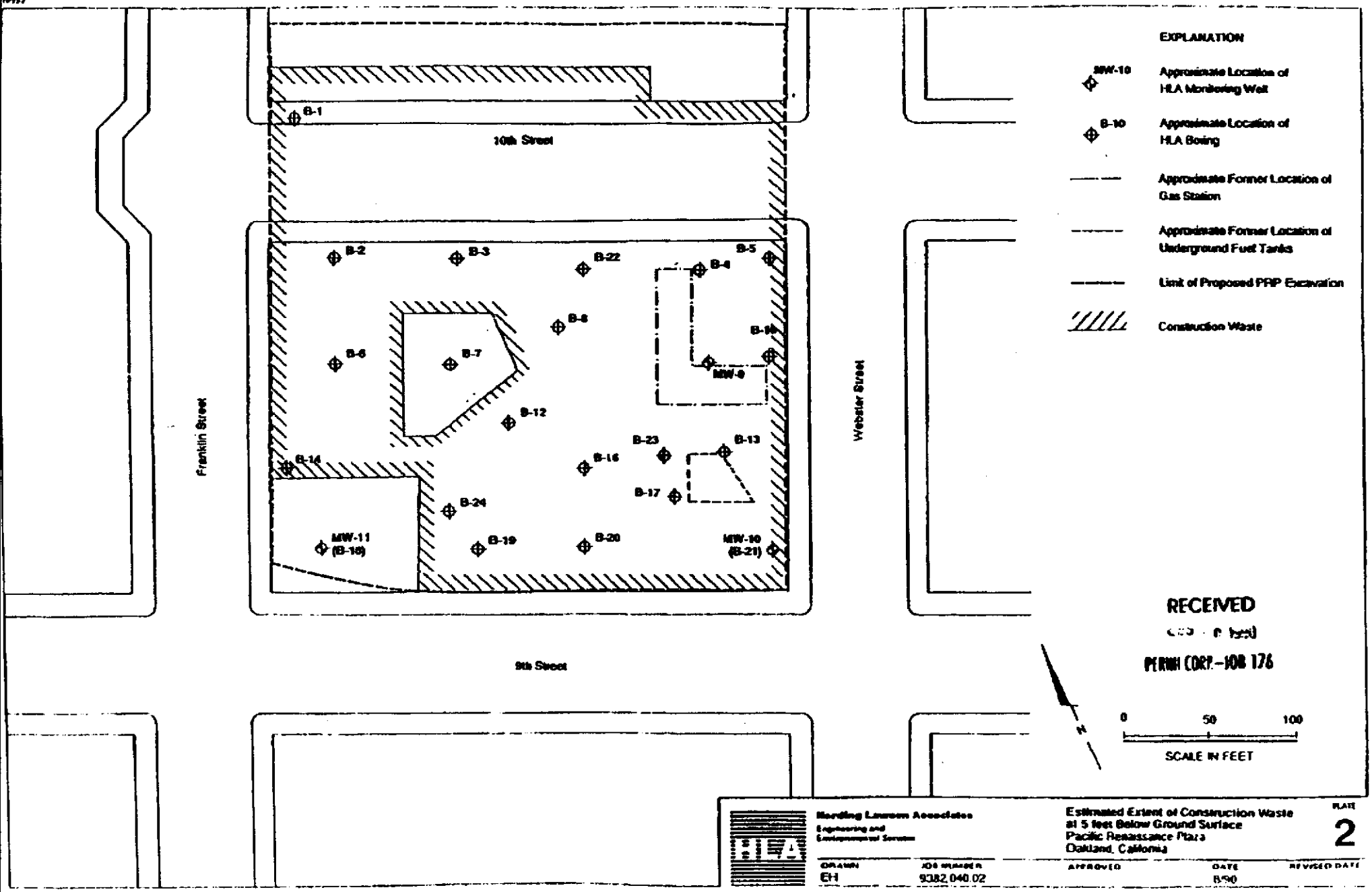
SHELL OIL COMPANY
ENVIRONMENTAL AFFAIRS
P. O. BOX 4320
HOUSTON, TX 77210

FOR ADDITIONAL INFORMATION ON THIS ENVIRONMENTAL DATA PLEASE CALL
(713) 241-2252

FOR EMERGENCY ASSISTANCE PLEASE CALL
SHELL: (713) 473-9461
CHEMTREC: (800) 424-9300

APPENDIX F

ESTIMATED EXTENT OF CONSTRUCTION WASTE PLATE 2, HLA


EXPLANATION
MW-10 Approximate Location of HLA Monitoring Well
B-10 Approximate Location of HLA Boring
Approximate Former Location of Gas Station
Approximate Former Location of Underground Fuel Tanks
Limit of Proposed PRP Excavation
Construction Waste
10th Street
9th Street
Franklin Street
Webster Street
B-1
B-2
B-3
B-22
B-4
B-5
B-8
B-6
B-7
B-9
MW-9
B-12
B-23
B-13
B-14
B-16
B-17
B-24
MW-11 (B-18)
B-19
B-20
MW-10 (B-21)
RECEIVED
PERRIN CORP.-JOB 176
0
50
100
SCALE IN FEET
Harding Lawson Associates
Engineering and Environmental Services
Estimated Extent of Construction Waste at 5 feet Below Ground Surface
Pacific Renaissance Plaza
Oakland, California
PLATE 2
DRAWN EH
JOB NUMBER 9382.040.02
APPROVED
DATE 8/90
REVISED DATE