

ENVIRONMENTAL
PROTECTION

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**HEALTH & SAFETY PLAN
SITE WORK ACTIVITIES**

**REMEDIAL INVESTIGATION
AIRPORT PLAZA SHOPPING CENTER
W. WINTON AND HESPERIAN BOULEVARD
HAYWARD, CALIFORNIA**

PREPARED FOR:

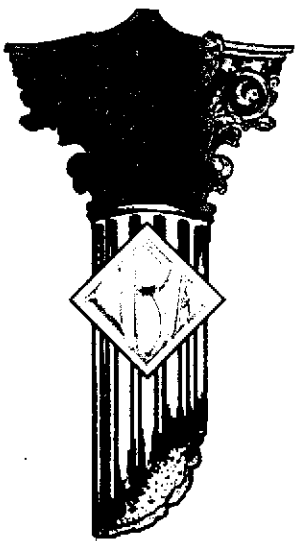
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PREPARED BY:

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ISSUED:

October 10, 1995
Revised October 27, 1995



October 27, 1995

Mr. James Crafts, Co-Trustee
Adolph P. Schuman Marital Trust
400 Sansome Street
San Francisco, California 94111

Subject: Health & Safety Plan
Remedial Investigation
Airport Plaza Shopping Center
W. Winton and Hesperian Boulevard
Hayward, California

Dear Mr. Crafts:

The purpose of this Health & Safety Plan is to govern health and safety activities during the site investigation. Please contact me if you have any questions regarding this plan.

Sincerely,

VAN BRUNT ASSOCIATES

Michael W. Van Brunt
Principal

MVB:lmr
94502.58
Enclosure

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Date Implemented: October 13, 1995

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SECTION 1 INTRODUCTION

This Health & Safety Plan (HASP) is a guidance document to be used during the work to investigate the source(s) of groundwater contamination at the site, determine the extent of contamination, and implement remedial actions.

This Health & Safety Plan shall aid the project manager and personnel in making health and safety decisions during soil and groundwater sampling, monitoring well installation and soil excavation activities at the project site. This location is currently under regulatory order to investigate and remediate the site. Accordingly, workers onsite require OSHA 40-hour Hazardous Waste Operations Training.

This Health & Safety Plan should be used as a primary source of information on health and safety matters by all site personnel. The Project Health & Safety Officer or their designee shall conduct a "tailgate" Health & Safety meeting at the site with individuals new to the site, to introduce them to site specific health and safety concerns. The Plan Acceptance Form shall be filled out by each individual attending the tailgate Health & Safety meeting.

PURPOSE

The purpose of this plan is to establish minimal personnel protection standards and mandatory safety practices and procedures. This plan assigns responsibilities, establishes standard operating procedures, and provides contingencies that may arise during site activities.

APPLICABILITY

The provisions of this plan are mandatory for all onsite tasks. All Van Brunt Associates (VBA) subcontractor personnel shall abide by this plan. The VBA Project Manager shall make one copy available onsite to VBA subcontractors, informing them of potential health and safety risks associated with the site. Subcontractors are required to comply with all regulatory requirements and are fully and solely responsible for the health and safety of their employees.

PROJECT DIRECTORY

Building Owner

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Adolph P. Schuman Marital Trust
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San Francisco, California 94111
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Mike Van Brunt
Mike Van Brunt

Driller Contractor #1

TEG
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Fax: (916) 452-5806

Drilling Contractor #3

Haz West

Alameda County Health Agency

Ms. Madhulla Logan, M.S.
Hazardous Materials Specialist
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Drilling Contractor #2

Precision Sampling, Inc.
Linda Carter
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Regional Water Quality Control Board

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Direct: (510) 293-5454
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SECTION 2 BACKGROUND

SITE ADDRESS:

Airport Plaza Shopping Center
Northwest Corner of Hesperian and W. Winton
23958 Hesperian Boulevard
Hayward, California
APN 432-0060-104-5
APN 432-0060-107-5

PREVIOUS SITE INVESTIGATION HISTORY

Background. Volatile organic compounds (VOC's) have been detected in the groundwater beneath the subject site and elsewhere in the course of the Texaco gas station subsurface investigation.

Historically, two dry cleaning operations have existed on the subject site which may have caused or contributed to the cause of the findings of VOC's in the groundwater. There is no direct evidence at the present time that the VOC's found in the groundwater were caused by or came from the historical nor current dry cleaning operations on the property.

Prior to the construction of the existing improvements in 1961, the subject site was bare land. Previous to that, the property was part of an orchard. Usually, there are no significant subsurface environmental problems associated with these previous land uses.

There is currently no regulatory agency record of any former UST's on the property. Specifically, the file on this property maintained by the Hayward Fire Department does not contain any reference to an underground storage tank. There are no known regulatory citations, actions, or cases open for the subject property.

Krazan & Associates, Inc. of Sacramento, California, completed a Phase I Environmental Site Assessment on November 11, 1994 for 23700 - 23958 Hesperian Boulevard for the Taco Bell Corporation, a potential occupant for a portion of the site. Taco Bell is considering building a restaurant onsite. Van Brunt Associates has field checked the contents of that report and found it to be thorough, complete, and accurate.

A former Texaco Service Station, now Exxon, is located on the adjacent land on the corner of Hesperian Boulevard and W. Winton Avenue. Groundwater contaminated by petroleum hydrocarbons has migrated laterally from the service station and has impacted the subsurface water of the subject site. This has been determined from a laboratory test of both groundwater (hydropunch) samples and the existing monitoring well on the subject property.

The responsible party (Texaco Refining, Inc.) of the existing Leaking Underground Storage Tanks (LUST) at the adjacent Texaco site (23390 Hesperian) believes that the VOC's found in the several monitoring wells sampled have come from "offsite" and suspects the subject site. Groundwater and soil vapor extraction and treatment at the adjacent Exxon service station is presently in operation.

Surrounding Community. The subject site is located in a commercial/residential setting in the City of Hayward, California. The property is built on Alameda County Assessor's Parcel Number 432-0060-104-5 and 432-0060-107-5. The area is generally commercial with single family residential units in the neighborhood to the east and north of the property. There is vacant lot on the north side of the former Antonio's Restaurant building.

The Hayward General Aviation Airport exists west of Hesperian Boulevard. The subject property is topographically flat.

Chemicals Historically Used Onsite. With the exception of the existing and historical dry cleaners, there are no public records nor uses of the site that would be considered unusual or a risk to the properties environmental liability.

SECTION 3 SUMMARY OF WORK

SCOPE OF WORK

The work to be performed onsite and offsite will include:

1. Field marking boring locations;
2. Drilling to groundwater and retrieving groundwater grab samples;
3. Soils boring and sampling;
4. Installing and developing groundwater monitoring wells;
5. Removing portions of underground features, focusing on sewer line(s);
6. Installation of groundwater remediation equipment; and
7. Abandonment of the above referenced features.

ESTABLISHMENT OF WORK ZONE

A work zone will be established around the area of work. The work zone is an area of sufficient size to allow safe completion of the work while maintaining control of access to the work area. The work zone will be restricted by requesting people not directly involved in the work to stay out of the immediate work area, and/or by restricting access by other suitable means, such as with a work fence, traffic cones or barricades. The site is fenced and will act as the primary work exclusion zone.

EXCAVATION

Backhoe work may be utilized to retrieve soil samples or remove the sewer line. Prior to soils excavation, underground utilities will be located using as-built engineering schematics for the building as well as by contacting the Underground Service Alert (USA). Although great care will be taken to locate and mark underground utilities prior to excavation, no amount of prior research can insure that all such utilities have been accounted for. The equipment operators will be instructed to use extreme care during excavation operations and will be closely monitored by project personnel. Should an excavation become unstable, or a foundation be encountered, appropriate shoring material will be employed to render the excavation stable. Under no circumstances will individuals be allowed to enter an unshored or shored excavation. All samples will be collected remotely using the backhoe bucket if access into the trench is not available.

SOIL SCREENING

During excavation and soils removal, measurements will be made of the air and soil. Air samples will be measured for health and safety purposes as described in the Health & Safety Plan. Soil samples will be measured for total ionizable vapors using an Organic Vapor Analyzer (OVA). This will be done to help characterize the vertical and lateral extent of contamination for health and safety purposes. Soil samples will be collected for OVA screening on approximately 3-foot centers for both excavation sidewalls and excavation bottom. OVA soil readings will be taken at a distance of not greater than 3-inches from freshly dug soil. The OVA will be calibrated daily using the appropriate zero gas and/or hexane following the manufacturer's recommendations.

SOIL DISPOSAL

Material removed from under the former dry cleaners and sewer trench will be field screened, classified and initially segregated into three stockpiles as contaminated, potentially contaminated or as potentially uncontaminated based on results from OVA measurements and visual observations. The segregated material will then be moved to a staging area, adjacent to the excavation, where material will be sampled and tested to confirm its initial classification. Each soil stockpile will be laid onto 10-mil polyethelene and covered with 10-mil polyethelene to prevent uncontrolled loss of VOC's to the air. Soil will be segregated to:

<u>CLASSIFICATION</u>	<u>OVA READING</u>
"Contaminated"	>100 ppm
"Potentially Contaminated"	50-100 ppm
"Potentially Uncontaminated"	0-50 ppm

All other excavated soils will also remain under a 10-mil polyethelene vapor barrier at the site pending laboratory sampling results. One sample will be collected for approximately each 10 cubic yards of material and submitted for laboratory analysis. Ultimate disposal options will be explored in the report which will be written as a result of this current phase of work. Under no circumstances will contaminated soils (soils shown to have a VOC level greater than 50 ppm) be allowed to stay onsite longer than 40 days after being exhumed.

WATER DISPOSAL

Groundwater extracted from monitoring wells, either during development or sampling that is not for laboratory analysis, shall be temporarily stored onsite in suitable DOT approved 55-gallon drum(s) pending waste characterization and profiling. Each drum will be individually numbered for tracking. Wastewater generated pursuant to drilling equipment decon procedures or other purposes will be stored and treated in a similar manner.

SITE SECURITY

During excavation, work areas will be established using caution tape and control barriers. No excavation is to be left open overnight. Temporary fencing has been placed around the site to afford security.

SECTION 4 HEALTH & SAFETY RISK ANALYSIS

PROJECT TEAM ORGANIZATION

Principal in Charge: Michael Van Brunt
Office: (510) 928-4444
Cellular: (510) 928-4444

Health & Safety Officer: Glenn Romig, P. E.
Office: (510) 685-5900

Included in Section 8 is a description of the responsibilities and work procedures of the project team members.

COMMUNICATIONS

All site personnel shall communicate all health and safety concerns to Glenn Romig, Health & Safety Officer

CHEMICAL AND SAFETY HAZARDS

The project is known to have low levels of solvents and petroleum hydrocarbons in the groundwater. Contact with these materials must be minimized to prevent dermal or respiratory exposure. Appropriate personnel protective equipment (PPE) will be used dependent onsite need. Specific PPE's are discussed in Section 5 which follows.

Underground Hazards. Underground Services Alert (USA) has field cleared the planned excavation and boring areas. USA cannot always locate all underground utilities. The equipment operators should be closely monitored and instructed to proceed with the excavation in a safe fashion.

Trip And Fall Hazards. Inattentiveness is one of the major factors contributing to injuries caused by slips, trips and falls. An employee who is not fully aware of his or her working conditions allows himself or herself to be put in a potentially dangerous position.

By practicing good housekeeping, trip hazards can be avoided. Working conditions are also made hazardous by the spilling of liquids, petroleum products and/or residual material onto working areas. If spills, unused material and construction debris are found in walkways, work areas and near the construction site, such hazards shall be immediately cleaned up.

Care must be taken to appropriately barricade the excavation to prevent onsite personnel and pedestrians from falling in. Excavations will be accomplished using mechanized heavy equipment. Personnel are directed to be vigilant of all remediation activities to prevent accidents. The site shall be protected 24 hours by 6' high cyclone fencing.

Collapse Hazards. When excavation is necessary at a jobsite, before work commences and during the performance of the work, the site shall be adequately protected to prevent sloughing of earth by shoring or sloping.

No employee shall enter or perform work in an excavation which requires that the person's head be below the surface of the ground until shoring and confined space procedures are followed.

The excavation will need to be appropriately shored to prevent excavation sidewalls from sloughing into the excavation and to protect the building foundation and onsite personnel. Under no circumstances are any onsite personnel to enter the excavation.

Employees are not permitted to work in or adjacent to any excavation until an inspection is conducted to determine that they will not be exposed to injuries resulting from moving equipment.

Overhead Wire Hazards. There are no overhead wires in the immediate vicinity of the planned borings or monitoring wells.

TOOLS AND EQUIPMENT HANDLING

Safety Devices. Employees must never remove, displace, damage, destroy or carry away any safety device, safeguard, notice or warning used at the Company facilities, Company property or customer job locations.

Never, in any way, interfere with the use of another employee's safety device or safeguard. The operator of all equipment shall verify that all guards and other protective devices are in their proper place, in good repair, and properly adjusted for safe operation. Any deficiency or malfunction must be reported immediately to the supervisor or safety representative.

Damaged/Unsafe Equipment - Repair Work. Equipment operators must not repair operating equipment or machinery, oil moving parts, except when the equipment or machinery is designed or fitted with safeguards to protect the employee while performing the work.

Equipment that is worn, damaged or otherwise defective to the extent that it is unsafe, must be reported immediately to the supervisor or Safety Representative.

Crane/Hoisting Equipment. Unauthorized persons are not to be permitted in the equipment cab or on the booms or buckets at any time. All unattended equipment shall be guarded against operation by unauthorized persons.

Cranes, derricks, hoists or other equipment shall not be used for side pulls or lifts that would affect the stability or overstress the equipment.

Hoisting equipment shall be loaded so that the load is in a stable position and does not exceed the designated safe load. Loads shall be test lifted, brakes checked and slings readjusted when required, to check the stability and safety of the lift.

Outriggers, when provided, shall be used for the stability and safe operation of the equipment. The operator shall personally check that the outriggers have been properly placed and blocked in position.

A mobile or overhead traveling crane, hoist or shovel shall not be operated unless the gong or other effective warning device is in suitable operating condition. Equipment surfaces and walkways shall be maintained free of oil, grease or debris and where necessary, non-slip material shall be used.

Wire rope, under tension, shall not be guided by the hands or feet. Employees shall avoid standing or passing under suspended loads. Extreme care shall be exercised in the selection, inspection and use of chains.

Use these precautions in dealing with wire rope slings:

Do not use knots to make slings;

Pad or block sharp corners;

Do not jerk loads; lift and lower them slowly;

Use slings of adequate capacity; consult the charts; and

Know how much weight you are lifting.

SECTION 5 PERSONNEL PROTECTION

Personnel protective equipment that will be required onsite are divided into respiratory and dermal protection. The assigned protective levels are D and C for respiratory protection and Level D for dermal protection. The site safety officer shall evaluate each condition and make a determination of appropriate response action(s).

GENERAL HEALTH AND SAFETY PROCEDURES

All personnel going onsite must be thoroughly briefed by the Health & Safety officer on anticipated hazards, safety practices, emergency procedures and communications, and should be trained in the use of safety equipment to be worn. The safety practices listed below must be followed:

- All respirator users must be medically cleared.
- Any required respiratory protective devices and clothing must be worn by all personnel going into areas designated for wearing protective equipment.
- Personnel must field fit-test prior to entering the respiratory regulated area.
- No facial hair which interferes with a satisfactory fit of the mask-to-face seal is allowed on personnel who are required to wear respirators.
- Contact with contaminated or suspected surfaces should be avoided. Whenever possible, do not walk through puddles, leachate, or discolored surfaces.
- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in any area designated as contaminated.
- Personnel should practice unfamiliar operations prior to doing the actual procedure in the field.
- Field crew members shall be familiar with the physical characteristics of the site, including:
 - A. Wind direction in relation to contaminated areas;
 - B. Accessibility to other personnel, equipment and vehicles;
 - C. Communications;
 - D. Exclusion zones;
 - E. Site access; and
 - F. Nearest water sources.
- All field crew members should make use of their senses to alert themselves to potentially dangerous situations which they should avoid, e.g., presence of strong and irritating or nauseating odors. However, they should never rely upon the sensory information as the basis for key safety decision-making.
- Personnel and equipment in the contaminated area should be kept to a minimum, consistent with effective site operations.
- Procedures for leaving a contaminated area must be planned and implemented prior to going onsite in accordance with the site specific Health & Safety plan.

- Exposed and contaminated body parts must be thoroughly washed upon leaving the work area.
- Medicine and alcohol can exacerbate the effects from exposure to toxic chemicals. Prescription drugs should not be taken by personnel on response operations where the potential for absorption, inhalation or ingestion of toxic substances exists, unless specifically approved by a qualified physician. Alcoholic beverage intake is prohibited 10 hours before and during response operations.

An onsite orientation session will be required for all onsite personnel and will include the following:

- Health effects and hazards of the chemicals identified or suspected onsite.
- Personal protection including use, care, and fitting of personnel protective equipment; and necessity for personal protection, its effectiveness, and limitations of the equipment.
- Decontamination procedures.
- Any prohibitions in the areas and zones, including site layout, procedures for entry and exit of areas and zones;
- Standard safe work practices; and
- Emergency procedures, including emergency contacts, instructions for implementing the emergency plan, and location of emergency equipment.

Additionally, routine Health & Safety meetings shall be held at the discretion of the project manager or project Health & Safety officer. In addition, all subcontractors hired by VBA are required to have the federally mandated 40-hour Hazardous Waste Operations and Emergency Response Training, as well as be under medical monitoring.

RESPIRATORY PROTECTION

Respiratory protection for Level D includes no respiratory protection necessary. Respiratory protection for Level C includes a full-face or half-face respirator equipped with organic vapor cartridges.

Onsite air monitoring with an Organic Vapor Analyzer (OVA) and colorimetric indicator tubes will be periodically be undertaken to determine levels of any organic vapors in air for choosing appropriate respiratory PPE. Should the OVA detect a level greater than 100 ppm eV, or should colorimetric indicator tube analysis detect benzene at a level greater than 1 ppm, Level C respiratory protection will be instituted until the vapors have been dissipated. The Permissible Exposure Limit (PEL) for gasoline is 300 ppm; the PEL for toluene is 100 ppm; the PEL for Xylene is 100 ppm; the PEL for benzene is 1 ppm.

The need for respiratory protection is not anticipated for this site.

DERMAL PROTECTION

Field work will begin in modified Level D personal protection. If air monitoring results of the work zone exceed the action levels specified below, then PPE will be upgraded as necessary to modified Level C. The table below identifies each of these levels and their respective requirements.

Personnel Protective and Monitoring Equipment Table

Item	Requirement
Modified Level D Personal Protective Equipment	<ul style="list-style-type: none"> • Hard-hat, dedicated work clothing (cotton coveralls or tyveks; can be used if deemed necessary by each worker), water repellent steel-toed boots, work gloves, latex gloves (as appropriate), nitrile gloves (as appropriate), first aid kit, fire extinguisher, warning tape, optional eye and hearing protection.
Modified Level C Personal Protective Equipment	<ul style="list-style-type: none"> • Add half-face respirator with OV-HEPA cartridges and mandatory tyveks to modified Level D protective equipment. • Change respirator cartridges upon detection of breakthrough (by smell), increase in breathing resistance, or daily (whichever is more frequent).
Atmospheric Monitoring	<ul style="list-style-type: none"> • Field organic vapor monitor capable of detecting organic vapor concentrations of 1 ppm (v/v). Field organic vapor monitor to be checked against or calibrated to known reference gas daily. Unless otherwise noted, field organic vapor meter consists of Thermo Environmental Instruments, Model OVM 580B, equipped with 10.0 eV photo-ionization detector, calibrated to 100 ppm v/v isobutylene. • Action levels (measurement in the breathing zone of work area): <ul style="list-style-type: none"> >5 ppm for 10 minutes; upgrade to modified Level C >50 ppm for 10 minutes; stop work and consult with project manager.
Visual Monitoring	<ul style="list-style-type: none"> • Evaluate coworkers and self for signs of fatigue and visual signs of distress due to physical labor and possible chemical exposure.

Visual monitoring should be routinely conducted by the workers. Workers should evaluate themselves for signs of fatigue as the work progresses. Work breaks should be taken as reasonably required to maintain safety and efficiency.

HEALTH AND SAFETY EQUIPMENT

The onsite field team will have the following health and safety equipment readily available whenever conducting site activities:

- Copy of the Health & Safety Plan
- First-Aid kit
- Fire extinguisher
- Soap, water and paper towels
- Organic Vapor Analyzer
- Gloves
- Full or half-face respirators with Organic Vapor cartridges

AIR MONITORING

Air monitoring will be performed to evaluate potential personal exposure to hazardous substances at the site during field activities. Decisions concerning respirator use will be influenced by the air monitoring results. At the site, the following air monitoring will be performed:

<u>CONTAMINANT</u>	<u>INSTRUMENT</u>
Total Organic Vapor	Organic Vapor Analyzer
Benzene	Colorimetric Tubes

The OSHA PEL for gasoline vapor is 300 ppm average over an 8-hour period. The 15 minute short-term exposure limit is 500 ppm. To ensure that no project workers are exposed to PEL, use either a photo-ionization detector (PID) or colorimetric indicator tubes periodically to test ambient air conditions.

If the PID or colorimetric indicator tube samples indicate hydrocarbon vapor levels of 100 ppm or greater, then daily air samples will be collected from representative project personnel using charcoal tube sampling methods (OSHA Method 1M1S1340). Personnel will be notified in writing of the results of any personal air samples and their significance. A copy of this report will be maintained in the employee's medical surveillance file.

SITE CONTROL MEASURES

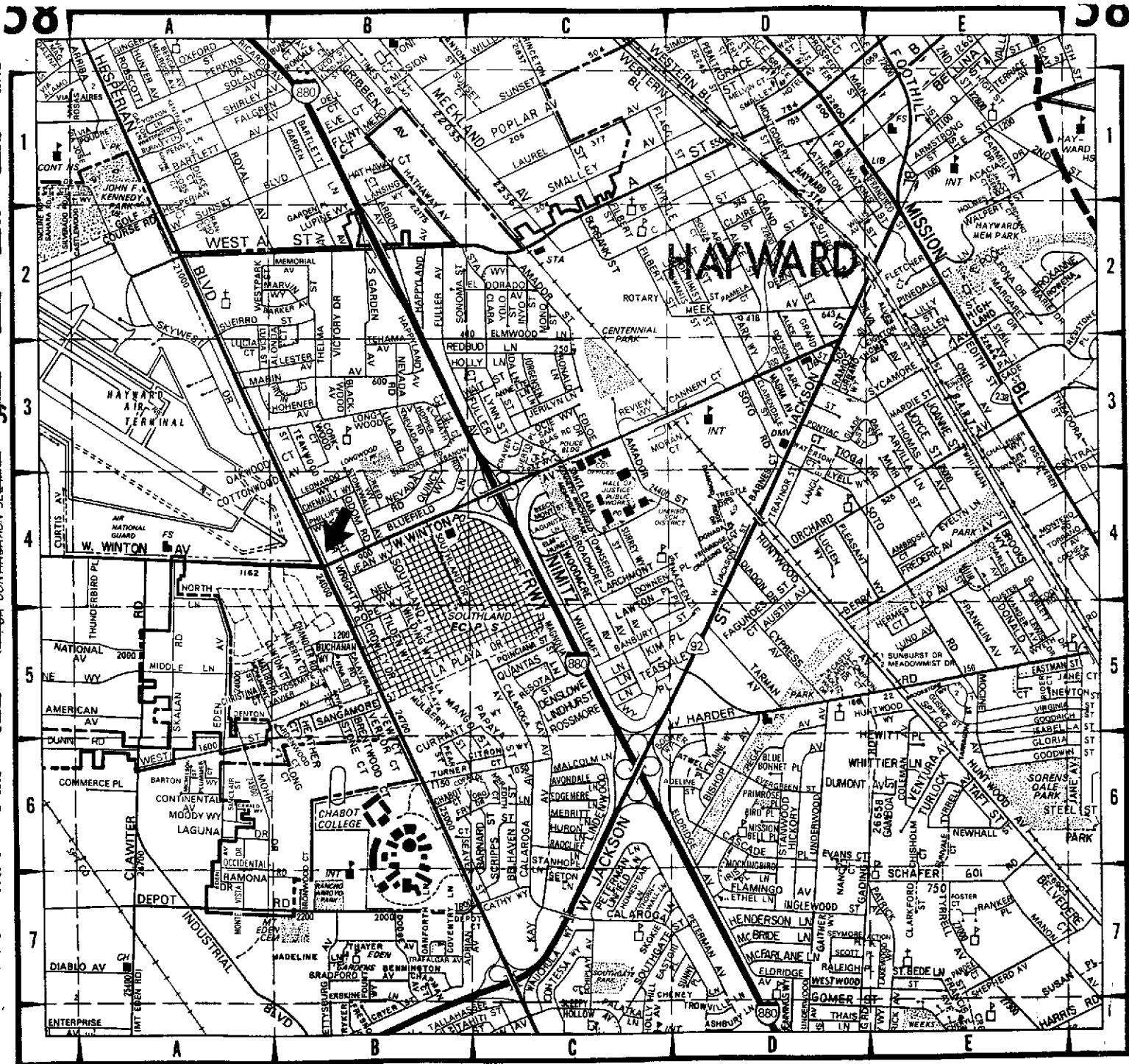
This site is located on industrial property. Exposure of onsite and offsite personnel to fugitive air emissions and potential accidents are not anticipated. Control boundaries will be established with caution tape and pylons or other measures as necessary. Should chemical exposure through the respiratory pathway exceed the levels established in this plan, work will cease and the site will be cleared of personnel and bystanders until such time as the potential for exposure is under control. Control measures can be both engineering controls or institution of respiratory protection. The VBA field supervisor and/or the VBA Health & Safety officer will implement boundary control and containment measures as necessary. Plastic sheeting will be used to minimize generation of fugitive vapor emissions from soil stockpiles and the excavation as needed. Protective plastic sheeting should be used to cover contaminated soil whenever the area does not need to be immediately accessed.

DECONTAMINATION PROCEDURES

Activities at the site will be of short duration, and exposure to any potential site chemicals should be minimal if proper precautions are followed. Simple and expedient decontamination procedures, appropriate to the site and work conditions, will be used.

Site decontamination procedures will include washing sampling equipment and potentially contaminated equipment with a soap and water solution, if appropriate. Disposable clothing will be segregated into contaminated and non-contaminated categories, drummed or otherwise bagged, labeled, dated and left onsite. All appropriate means must be used in the field to prevent the contamination of equipment and personnel.

**SECTION 6
FIGURES
SITE LOCATION:
Airport Plaza Shopping Center
N/W Corner of Hesperian and W. Winton
23958 Hesperian Blvd., Hayward, California**



FOR CONTINUOUS SET MAP

HEALTH & SAFETY PLAN ACCEPTANCE FORM

I have attended a tailgate Health & Safety meeting and agree to abide by the contents of the Health & Safety Plan.

JOB: Airport Plaza Shopping Center
 Hayward, California

DATE: _____

Signature

Company

Name (please print)

Date

Signature

Company

Name (please print)

Date

Signature

Company

Name (please print)

Date

Signature

Company

Name (please print)

Date

Topics:

SECTION 8 PROJECT TEAM RESPONSIBILITIES

GOVERNMENT AND VBA STANDARDS

Currently, the health and safety of workers performing hazardous waste activities, regulated by OSHA, is 29 CFR 1910.120.

SITE SAFETY OFFICER

The site safety officer, Glenn Romig, shall direct the onsite investigation and operation efforts and has the primary responsibility for:

- Assuring that appropriate PPE is available and is properly utilized by all onsite VBA personnel. The site safety officer or designee shall also advise subcontractors as to the necessity and appropriateness of PPE and may, if the situation requires, remove subcontractors from the job for practicing unsafe procedures;
- Assuring that personnel are aware of the provisions of this plan and are instructed in the work practices necessary to ensure safety and the procedures for dealing with emergencies;
- Assuring that personnel are aware of potential hazards associated with site operations;
- Monitoring the safety performance of all personnel to ensure that the required work practices are employed;
- Correcting any work practices or conditions that may result in injury or exposure to hazardous substances;
- Preparing accident/incident reports; and
- Assuring the completion of the Plan Acceptance Form by all personnel prior to their going onsite, and ensuring that they understand the provisions of the form.

Unless the project is designated by the VBA Site Safety officer to be hazardous enough to require a professional safety person, the project Health & Safety officer will be a member of the assigned project team who is responsible for site safety, usually the project geologist. The responsibilities of the Health & Safety officer will be:

- Establishing and directing the safety program;
- Onsite implementation of Health & Safety Plan;
- Communicating safety issues to project manager;
- Performing atmospheric monitoring;
- Conducting a tailgate Health & Safety meeting with all new persons to the site; and
- Directly supervising, in the field, the health and safety aspects of response activities when necessary

PROJECT PERSONNEL/EQUIPMENT OPERATOR

Project personnel involved in the field investigation and operation are responsible for:

- Taking all possible precautions to prevent injury to themselves and to other employees;
- Implementing the site Health & Safety Plan and reporting to the project manager, site manager, or safety officer any deviations from the anticipated conditions described in the plan;
- Performing only those tasks which they believe they can do safely, and immediately reporting any accidents or unsafe conditions to the onsite supervisor or safety officer; and
- Each operator of equipment shall inspect and ensure that the equipment is in a safety operating condition, including all guards and safety devices are in place.

SECTION 9 CHEMICAL HAZARDS/MSDS

HAZARDS OF PETROLEUM HYDROCARBONS

Petroleum hydrocarbons are a family of petroleum based compounds consisting of carbon and hydrogen. A wide variety of branched, straight-chain and ringed structures is possible given the nature of the way carbon binds to itself and hydrogen. Petroleum hydrocarbons exist as solids, liquids and gasses. Some common liquid petroleum hydrocarbons include gasoline, diesel fuel, jet fuel and kerosene.

These liquids are complex mixtures containing numerous species of hydrocarbon. The toxicity and environmental behavior of these fuel mixtures, and any additives, depends on the mixture of constituents and concentrations. Gasoline, for instance, is a mixture containing approximately 150 different hydrocarbon species, several elements (in small concentrations), and fuel additives such as ethylene dibromide, ethylene dichloride, tetramethyl lead and tetraethyl lead.

The constituents of most concern in these fuels is benzene, a known human carcinogen, which may consist of up to 5% of the total volume in gasoline. The main routes of exposure to petroleum hydrocarbons are inhalation and skin absorption.

Another major hazard to consider in dealing with petroleum hydrocarbon fuels is fire and explosion. If gasoline vapors reach 1.4% to 7.6% in air, a violent explosion may occur in the presence of an ignition source.

Acute exposure to hydrocarbons primarily cause Central Nervous System (CNS) effects such as headache, dizziness, weakness, loss of coordination, loss of consciousness and death. Chronic exposure to hydrocarbons may cause skin drying and irritation, cancer, peripheral neuropathy, and decreased immunologic response. These health effects are highly dependent on exposure concentration and duration. Personal protection against exposure to petroleum hydrocarbon fuels would include primarily respiratory and dermal protection.

The Occupational Health and Safety Administration (OSHA) has set limits for exposure to many of the constituents of petroleum hydrocarbon fuels. Below is a table which describes the OSHA Permissible Exposure Limits (PELs), the ACGIH Threshold Limit Values (TLVs) and levels that are known to be immediately dangerous to life and health (IDLH) for some petroleum hydrocarbon constituents.

<u>COMPOUND</u>	<u>PEL</u>	<u>TLV</u>	<u>IDLH</u>	<u>CARCINOGEN</u>
Gasoline		300	N/A	yes
Benzene	1.0	10.0	N/A	yes
Toluene	100	100	2000 ppm	no
Xylene	100	100	1000 ppm	no
Tetraethyl lead	0.075	0.1	3.6 ppm	no
Tetramethyl lead	0.075	0.15	N/A	no
Ethylene Dibromide	20	0.045	N/A	yes

PEL/TLV are expressed as parts per million (ppm), except for tetramethyl and tetraethyl lead, which are expressed as mg/m³. In order to protect against overexposure to these compounds, the ambient air will be monitored with a "lower explosion limit/oxygen content meter" and/or handles photo-ionizing detector (PID). As soon as vapor concentrations approach 75% of the exposure limit value, work will cease until all onsite personnel have donned protective clothing and suitable respiratory devices.

Personnel exposures to excessive job-related hazards are expected to be minimal using these safeguards.

**Chemical Hazard Evaluation
Crafts/Hesperian**

Chemical	Maximum Soil Concentrations (mg/kg)	Maximum Groundwater Concentrations (mg/L)	Odor Threshold (ppm v/v)	Lower Explosive Limit (ppm v/v)	Permissible Exposure Limit (ppm v/v)	Time Weighted Average (ppm v/v)	Immediately Dangerous to Life and Health (ppm v/v)
Tetrachloroethylene-PCE	NM	5 ug/L MCL (3742)	50 ppm	Not flammable or explosive	37.5ppm STEL	25ppm 8Hr. TWA	NA
Total Petroleum Hydrocarbons as Gasoline	NM	NM	NA	14,000	300	300	NA
Benzene	NM	NM	12	13,000	1	10	2,000
Toluene	NM	NM	2.9	13,000	100	100	2,000
Ethylbenzene	NM	NM	2.3	10,000	100	100	2,000
Xylenes	NM	NM	1.1	10,000	100	100	10,000
Lead	NM	NM	NA	Not flammable or explosive	0.05 mg/m ³	0.15 mg/m ³	NA

General Notes

BOLD-Indicates the product(s)/chemicals that are of primary focus

- (a) Exposure criteria from: (1) American Conference of Governmental Industrial Hygienists, *1990-1991 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*, (2) National Institute for Occupational Safety and Health, *Pocket Guide to Chemical Hazards*, 1985, (3) American Conference of Governmental Industrial Hygienists, *Guide to Occupational Exposure Values*, Undated (circa 1990), (4) Amoores, J. E. and Hautala, E., *Odor as an Aid to Chemical Safety: Odor Thresholds Compared with Threshold Limit Values and Volatilities for 214 Industrial Chemicals in Air and Water Dilution*, Journal of Applied Toxicology, Volume 3, Number 6, 1983, and (5) *Material Safety Data Sheet, Chevron Unleaded Gasoline*, Chevron Environmental Health Center, Richmond CA, 12 September 1991.
- (b) NM = not measured.
- (c) NA = applicable value was not found in the cited references.
- (d) < indicates parameter below detection limit.

<p>COMMON SYNONYMS: Carbon dichloride Ethyene tetrachloride PCE PERC Perchloroethylene Tetrachloroethene Tetrachloroethylene</p>	<p>CAS REG.NO.: 127-18-14 NIOSH NO: KX3850000</p> <p>FORMULA: C_2Cl_4</p> <hr/> <p>STRUCTURE:</p> $\begin{array}{c} Cl-C=C-Cl \\ \quad \\ Cl \quad Cl \end{array}$	<p>AIR W/V CONVERSION FACTOR at 25°C (12)</p> <p>6.78 mg/m³ ≈ 1 ppm; 0.147 ppm ≈ 1 mg/m³</p> <hr/> <p>MOLECULAR WEIGHT: 165.85</p>
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<p>REACTIVITY</p>	<p>Reactions of halogenated organic materials such as tetrachloroethylene with cyanides, mercaptans or other organic sulfides typically generate heat, while those with amines, azo compounds, hydrazines, caustics or nitrides commonly evolve heat and toxic or flammable gases. Reactions with oxidizing mineral acids may generate heat, toxic gases and fires. Those with alkali or alkaline earth metals, certain other chemically active elemental metals like aluminum, zinc or magnesium, organic peroxides or hydroperoxides, strong oxidizing agents, or strong reducing agents typically result in heat generation and explosions and/or fires (511).</p>
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<p>PHYSICO-CHEMICAL DATA</p>	<ul style="list-style-type: none"> ● Physical State: Liquid (at 20°C) (23) ● Color: Colorless (23) ● Odor: Ether-like ● Odor Threshold: 50.000 ppm (38) ● Density: 1.6250 g/mL (at 20°C) (23) ● Freeze/Melt Point: -22.40°C (23) ● Boiling Point: 121.00°C (23) ● Flash Point: None ● Flammable Limits: Nonflammable
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<p>PHYSICO-CHEMICAL DATA (Cont.)</p>	<ul style="list-style-type: none"> • Autoignition Temp.: Nonflammable • Vapor Pressure: 1.40E+01 mm Hg (38) (at 20°C) • Satd. Conc. in Air: 1.2600E+05 (67) mg/m³ (at 20°C) • Solubility in Water: 1.50E+02 (38) mg/L (at 20°C) • Viscosity: 0.890 (estimate)(at 20°C) (21) • Surface Tension: 3.1300E+01 (59) dyne/cm (at 20°C) • Log (Octanol-Water Partition Coeff.): 3.14 (29) • Soil Adsorp. Coeff.: 6.65E+02 (652) • Henry's Law Const.: 2.27E-02 (74) atm · m³/mol (at 20°C) • Bioconc. Factor: 4.90E+01 (bluegill) (170,659) 6.60E+01 (estim)
<p>PERSISTENCE IN THE SOIL-WATER SYSTEM</p>	<p>Relatively mobile in soil-water systems, including transport of vapor through air-filled pores as well as transport in solution. Chemical is resistant to hydrolysis and to biodegradation (except by acclimated mixed cultures); it may thus persist for months to years (or longer).</p>
<p>PATHWAYS OF EXPOSURE</p>	<p>The primary pathway of concern from a soil-water system is the migration of tetrachloroethylene to ground-water used as sources for drinking water. There is substantial evidence that such migration has occurred in the past. Inhalation resulting from volatilization from surface soils and drinking water may also be important.</p>

<p>HEALTH HAZARD DATA</p>	<p>Signs and Symptoms of Short-term Human Exposure: (45)</p> <hr/> <p>Ingestion and inhalation cause nausea, vomiting, headache, dizziness, drowsiness and tremors. Skin contact with liquid causes irritation and blistering. Both liquid and vapor are irritating to the eyes.</p> <p><u>Acute Toxicity Studies: (3504)</u></p> <p>INHALATION: LC₅₀ 5200 ppm · 4 hr Mouse LC₅₀ 5040 ppm · 8 hour Rat</p> <p>ORAL: LD₅₀ 8850 mg/kg Rat LD₅₀ 8100 mg/kg Mouse</p> <p>SKIN: LD₅₀ 64680 mg/kg · 10-day Mouse</p> <p><u>Long-Term Effects: Liver and kidney toxicity</u></p> <p><u>Pregnancy/Neonate Data: Negative</u></p> <p><u>Genotoxicity Data: Negative</u></p> <p>Carcinogenicity Classification: IARC - Group 2B (possibly carcinogenic to humans) NTP - Clear evidence in mice, male rats; some evidence in female rats EPA - Group B2 (sufficient evidence in animals and inadequate evidence in humans)</p>
<p>HANDLING PRECAUTIONS (38)</p>	<p>Handle chemical only with adequate ventilation.</p> <ul style="list-style-type: none"> • Vapor concentrations of 100-500 ppm: any supplied-air respirator or self-contained breathing apparatus with full facepiece; gas mask with organic vapor canister; chemical cartridge respirator with full facepiece and organic vapor cartridge. • Above 500 ppm: self-contained breathing apparatus with full facepiece operated in positive-pressure mode. • Chemical goggles if there is probability of eye contact. • Butyl, natural rubber, neoprene or PVC gloves/apron/boots to prevent repeated or prolonged skin contact with the liquid.

ENVIRONMENTAL AND OCCUPATIONAL STANDARDS AND CRITERIA

AIR EXPOSURE LIMITS:

Standards

- OSHA TWA (8-hr): 25 ppm;
- AFOSH PEL (8-hr TWA): 25 ppm; STEL (15-min): 37.5 ppm

Criteria

- NIOSH IDLH (30 min): deleted: NIOSH has recommended that the substance be treated as a potential human carcinogen.
- NIOSH REL: Lowest feasible limit
- ACGIH TLV® (8-hr TWA): 50 ppm
- ACGIH STEL (15 min): 200 ppm

WATER EXPOSURE LIMITS:

Drinking Water Standards (3742)

MCLG: 0 µg/L (proposed)

MCL : 5 µg/L (proposed)

EPA Health Advisories and Cancer Risk Levels (3977)

The EPA has developed the following Health Advisories which provide specific advice on the levels of contaminants in drinking water at which adverse health effects would not be anticipated.

- 1-day (child): 2 mg/L
- 10-day (child): 2 mg/L
- longer-term (child): 1 mg/L
- longer-term (adult): 5 mg/L
- 1E-04 cancer risk: 70 µg/L

ENVIRONMENTAL AND OCCUPATIONAL STANDARDS AND CRITERIA (Cont.)

WHO Drinking Water Guideline (666)

A tentative health-based guideline for drinking water of 10 $\mu\text{g/L}$ has been proposed for tetrachloroethylene. A daily per capita consumption of two liters was assumed.

EPA Ambient Water Quality Criteria

- Human Health (355)
 - Based on ingestion of contaminated water and aquatic organisms (1E-05, 1E-06, 1E-07 cancer risk), 8 $\mu\text{g/L}$, 0.8 $\mu\text{g/L}$, 0.08 $\mu\text{g/L}$.
 - Based on ingestion of drinking water only, (1E-04, 1E-05, 1E-06 cancer risk), 70 $\mu\text{g/L}$, 7 $\mu\text{g/L}$, 0.7 $\mu\text{g/L}$.

- Aquatic Life (355)
 - Freshwater species
 - acute toxicity:
no criterion, but lowest effect level occurs at 5280 $\mu\text{g/L}$.

 - chronic toxicity:
no criterion, but lowest effect level occurs at 840 $\mu\text{g/L}$.

 - Saltwater species
 - acute toxicity:
no criterion, but lowest effect level occurs at 10,200 $\mu\text{g/L}$.

 - chronic toxicity:
no criterion, but lowest effect level occurs at 450 $\mu\text{g/L}$.

REFERENCE DOSES:

ORAL: 1.000E+01 $\mu\text{g/kg/day}$ (3744)

REGULATORY STATUS (as of 01-MAR-89)

Promulgated Regulations

• Federal Programs

Clean Water Act (CWA)

Tetrachloroethylene is listed as a toxic pollutant, subject to general pretreatment regulations for new and existing sources, and effluent standards and guidelines (351, 3763). Effluent limitations have been set for tetrachloroethylene effluent in the following point source categories: electroplating (3767), organic chemicals, plastics, and synthetic fibers (3777), steam electric power generating (3802), metal finishing (3768), iron and steel manufacturing (354), and metal molding and casting (892). Limitations vary depending on the type of plant and industry.

Safe Drinking Water Act (SDWA)

Tetrachloroethylene is on the list of 83 contaminants required to be regulated under the SDWA of 1974 as amended in 1986 (3781). It is listed as an unregulated contaminant requiring monitoring in all community water systems and non-community non-transient water systems (3771). In states with an approved Underground Injection Control program, a permit is required for the injection of tetrachloroethylene-containing wastes designated as hazardous under RCRA (295).

Resource Conservation and Recovery Act (RCRA)

Tetrachloroethylene is identified as a toxic hazardous waste (U210) and a hazardous waste constituent (3783,3784). Non-specific sources of tetrachloroethylene-containing waste are solvent use (or recovery) activities, chlorinated aliphatic hydrocarbon production, and spent solvent mixtures containing 10% or more tetrachloroethylene (325). Waste streams from the following industries contain tetrachloroethylene and are listed as specific sources of hazardous waste: organic chemicals (production of carbon tetrachloride, 1,2-dichloroethane, vinyl chloride, and toluene diisocyanate) and inorganic chemicals (chlorine production) (3774, 3765). Effective July 8, 1987, the land disposal of hazardous wastes which contain halogenated organic compounds in total concentrations greater than or equal to 1000 mg/kg is prohibited. Effective August 8, 1988, the underground injection into deep wells of these wastes is prohibited. Certain variances exist until May, 1990 for land and injection well disposal of some wastewaters and non-wastewaters for which Best Demonstrated Available Technology (BDAT) treatment standards have not been promulgated by EPA (3786). Tetrachloroethylene is included on EPA's ground-water monitoring list. EPA requires that all hazardous waste treatment, storage, and disposal facilities monitor their ground-water for chemicals on this list when suspected contamination is first detected and annually thereafter (3775).

Toxic Substances Control Act (TSCA)

Manufacturers, processors, or importers who possess health and safety studies on tetrachloroethylene must submit them to EPA (3789).

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

Tetrachloroethylene is designated a hazardous substance under CERCLA. It has a reportable quantity (RQ) limit of 0.454 kg. Reportable quantities have also been issued for RCRA hazardous waste streams containing tetrachloroethylene but these depend upon the concentration of the chemicals in the waste stream (3766). Under SARA Title III Section 313, manufacturers, processors, importers, and users of tetrachloroethylene must report annually to EPA and state officials their releases of this chemical to the environment (3787).

Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)

Tetrachloroethylene is exempt from a tolerance requirement when used as a solvent or cosolvent at a level of no more than 0.6% in pesticide formulations applied to growing crops or to raw agricultural commodities after harvest. Exemptions also apply when it is used as a solvent in pesticide formulations applied to animals (315).

Marine Protection Research and Sanctuaries Act (MPRSA)

Ocean dumping of organohalogen compounds as well as the dumping of known or suspected carcinogens, mutagens or teratogens is prohibited except when they are present as trace contaminants. Permit applicants are exempt from these regulations if they can demonstrate that such chemical constituents are non-toxic and non-bioaccumulative in the marine environment or are rapidly rendered harmless by physical, chemical or biological processes in the sea (309).

Occupational Safety and Health Act (OSHA)

Employee exposure to tetrachloroethylene shall not exceed an 8-hour time-weighted average (TWA) of 25 ppm (3539).

Clean Air Act (CAA)

EPA lists tetrachloroethylene as a hazardous air pollutant for which it will establish national emission standards under Section 112 of the Clean Air Act (3803).

Hazardous Materials Transportation Act (HMTA)

The Department of Transportation has designated tetrachloroethylene as a hazardous material with a reportable quantity of 0.454 kg, subject to requirements for packaging, labeling and transportation (3180).

Food, Drug and Cosmetic Act (FDCA)

Tetrachloroethylene is approved for use as an indirect food additive as a component of adhesives (3209).

• State Water ProgramsALL STATES

All states have adopted EPA Ambient Water Quality Criteria and NPDPWRs (see Water Exposure Limits section) as their promulgated state regulations, either by narrative reference or by relisting the specific numeric criteria. These states have promulgated additional or more stringent criteria:

CALIFORNIA

California has an action level of 4 $\mu\text{g/L}$ for drinking water (3098).

CONNECTICUT

Connecticut has a quantification limit of 2 $\mu\text{g/L}$ and an action level of 20 $\mu\text{g/L}$ for drinking water (3137,3138).

FLORIDA

Florida has set an MCL of 3 $\mu\text{g/L}$ for drinking water (3219).

KANSAS

Kansas has an action level of 7 $\mu\text{g/L}$ for ground-water (3213).

NEW HAMPSHIRE

New Hampshire has set an enforceable Toxic Contaminant Level (TCL) for tetrachloroethylene in drinking water of 2.3 mg/L (assumes a child weighing 10 kg who drinks one liter of water per day) (3710).

NEW JERSEY

New Jersey has set an MCL of 1 $\mu\text{g/L}$ (ppb) for drinking water (3497).

OKLAHOMA

Oklahoma has a water quality criterion of 1.6 $\mu\text{g/L}$ for ground-water, and has set a nonenforceable Toxic Substance Goal of zero for public and private surface waters (3534).

PENNSYLVANIA

Pennsylvania has set a human health criterion (cancer risk level) of 0.7 $\mu\text{g/L}$ for surface waters (3561).

RHODE ISLAND

Rhode Island has an acute freshwater quality guideline of 240 $\mu\text{g/L}$ and a chronic guideline of 5.3 $\mu\text{g/L}$ for the protection of aquatic life in surface waters. These guidelines are enforceable under Rhode Island state law (3590).

SOUTH DAKOTA

South Dakota requires tetrachloroethylene to be nondetectable, using designated test methods, in ground-water (3671).

VERMONT

Vermont has a preventive action limit of 0.07 $\mu\text{g/L}$ and an enforcement standard of 0.70 $\mu\text{g/L}$ for tetrachloroethylene in ground-water (3682).

WISCONSIN

Wisconsin has a preventive action limit of 0.1 $\mu\text{g/L}$ and an enforcement standard of 1 $\mu\text{g/L}$ for tetrachloroethylene in ground-water (3840).

Proposed Regulations• Federal ProgramsSafe Drinking Water Act (SDWA)

EPA has proposed a maximum contaminant level goal (MCLG) of zero and a maximum contaminant level (MCL) of 5 $\mu\text{g/L}$ for tetrachloroethylene as part of the National Primary Drinking Water Regulations. This action is expected in May, 1989, with promulgation scheduled for December, 1990 (3759).

Resource Conservation and Recovery Act (RCRA)

EPA has proposed that solid wastes be listed as hazardous because they exhibit the characteristic defined as EP toxicity when the TCLP extract concentration is equal to or greater than 0.1 mg/L tetrachloroethylene. Final promulgation of this Toxicity Characteristic Rule is expected in June, 1989 (1565). EPA has proposed listing wastestreams from the following industries as specific sources of tetrachloroethylene-containing wastes: organic chemicals (1,1,1-trichloroethane production), and inorganic chemicals (2,4-D production) (3795).

- State Water Programs

MOST STATES

Most states are in the process or revising their water programs and proposing changes in their regulations which will follow EPA's changes when they become final. Contact with the state officer is advised. Changes are projected for 1989-90 (3683).

CALIFORNIA

California has proposed an MCL of 5 $\mu\text{g/L}$ for drinking water (3096).

MINNESOTA

Minnesota has proposed a Recommended Allowable Limit (RAL) of 6.6 $\mu\text{g/L}$ for tetrachloroethylene in drinking water (3451). Minnesota has also proposed a Sensitive Acute Limit (SAL) of 2110 $\mu\text{g/L}$ for designated surface waters, and chronic criteria of 6.6 $\mu\text{g/L}$ for designated ground-waters and 3.8 $\mu\text{g/L}$ for designated surface waters for the protection of human health (3452).

NEW JERSEY

New Jersey has proposed a water quality criterion of 1 $\mu\text{g/L}$ for class FW2 surface waters (3496).

EEC DirectivesDirective on Ground-Water(538)

Direct discharge into ground-water (i.e. without percolation through the ground or subsoil) of organohalogen compounds and substances which may form such compounds in the aquatic environment, substances which possess carcinogenic, mutagenic or teratogenic properties in or via the aquatic environment, and mineral oils and hydrocarbons is prohibited. Appropriate measures deemed necessary to prevent indirect discharge into ground-water (i.e., via percolation through ground or subsoil) of these substances shall be taken by member countries.

Directive on the Quality Required of Shellfish Waters (537)

The mandatory specifications for organohalogenated substances specify that the concentration of each substance in the shellfish water or in shellfish flesh must not reach or exceed a level which has harmful effects on the shellfish and larvae. The specifications for organohalogenated substances state that the concentration of each substance in shellfish flesh must be so limited that it contributes to the high quality of the shellfish product.

Directive Relating to the Classification, Packaging and Labeling of Dangerous Preparations (Solvents) (544)

Tetrachloroethylene is listed as a Class II/b harmful substance and is subject to packaging and labeling regulations.

Directive on the Discharge of Dangerous Substances (535)

Organohalogen, carcinogens or substances which have a deleterious effect on the taste and/or odor of human food derived from aquatic environments cannot be discharged into inland surface waters, territorial waters or internal coastal waters without prior authorization from member countries which issue emission standards. A system of zero-emission applies to discharge of these substances into ground-water.

Directive on Toxic and Dangerous Wastes (542)

Any installation, establishment, or undertaking which produces, holds and/or disposes of certain toxic and dangerous wastes including phenols and phenol compounds; organic-halogen compounds, excluding inert polymeric materials and other substances referred to in this list or covered by other Directives concerning the disposal of toxic and dangerous waste; chlorinated solvents; organic solvents; biocides and phyto-pharmaceutical substances; ethers and aromatic polycyclic compounds (with carcinogenic effects) shall keep a record of the quantity, nature, physical and chemical characteristics and origin of such waste, and of the methods and sites used for disposing of such waste.

Directive on the Classification, Packaging and Labeling of Dangerous Substances (787)

Tetrachloroethylene is classified as a harmful substance and is subject to packaging and labeling regulations. Tetrachloroethylene may contain a stabilizer and if the stabilizer changes the dangerous properties of this substance should be labeled in accordance with rules in Annex I.

The predominant effect of acute exposure to high concentrations of tetrachloroethylene vapor is depression of the central nervous system, characterized by vertigo, confusion, inebriation-like symptoms, tremors and numbness. Kidney impairment and hepatotoxic effects have been reported after accidental exposures, but are not well documented. The lack of long-term exposure data makes assessment of long-term, low-level exposure to tetrachloroethylene in drinking water difficult. However, the pronounced toxic nephropathy observed in rodents chronically exposed to tetrachloroethylene by ingestion and the increased incidences of liver carcinoma in mice and leukemia in rats raise concerns of possible human health effects associated with prolonged exposure to tetrachloroethylene.

17.4 SAMPLING AND ANALYSIS CONSIDERATIONS

Determination of tetrachloroethylene concentrations in soil and water requires collection of a representative field sample and subsequent laboratory analysis. Due to the volatility of tetrachloroethylene, care is required to prevent losses during sample collection and storage. Soil and water samples should be collected in airtight containers with no headspace; analysis should be completed within 14 days of sampling. However, recent studies (3430) show large losses of volatiles from soil handling. At the present, the best procedure is to collect the needed sample in an EPA VOA vial, seal with a foil-lined septum cap, and analyze the entire contents in the vial using a modified purge and trap apparatus. In addition to the targeted samples, quality control samples such as field blanks, duplicates, and spiked matrices may be specified in the recommended methods.

EPA-approved procedures for the analysis of tetrachloroethylene, one of the EPA priority pollutants, in aqueous samples include EPA Methods 601, 624, and 1624 (65), and Methods 8010 and 8240 (65). The sample introduction technique most useful for aqueous samples is the purge and trap method. An inert gas is bubbled through the aqueous sample in a purging chamber at ambient temperature, transferring the tetrachloroethylene from the aqueous phase to the vapor phase and onto a sorbent trap. The trap is then heated and backflushed to desorb the tetrachloroethylene and transfer it onto a gas chromatographic (GC) column. The GC column is programmed to separate the volatile organics; tetrachloroethylene is then detected with a halide specific detector (Methods 601 and 8010) or a mass spectrometer (Methods 624, 1624, and 8240). For samples that contain high concentrations, direct injection may also be used. The generalized procedure for sample preparation for the analysis of volatile organics by purge and trap (Method 5030) (63) also recommends that samples be screened prior to the purge and trap step to prevent contamination of the system. The recommended screening techniques involve the analysis of a headspace sample by GC with photo-ionization or electrolytic conductivity detectors or the analysis of a solvent extract by GC with flame ionization or electrolytic conductivity detectors.

The EPA procedures recommended for tetrachloroethylene analysis in soil and waste samples, Methods 8010 and 8240 (63), differ from the procedures for aqueous

samples primarily in the method by which the analyte is introduced into the GC. The recommended method for low level samples (< 1 mg/kg) involves dispersing the soil or waste sample in water and purging in a heated purge and trap device. The trap is desorbed and analyzed as described above. Recently introduced wide bore capillary columns show promise for increasing the performance of the GC analysis (3402, 3184, 3443).

Other methods that have been used to quantitate tetrachloroethylene in soil and water include purge and trap with flame ionization detection (3263) and solvent extraction with electron capture detection (3352).

Typical tetrachloroethylene detection limits that can be obtained in aqueous samples (including wastewaters without interferences) and in non-aqueous samples (wastes, soils, etc.) are shown below. The actual detection limit achieved in a given analysis will vary with instrument sensitivity and matrix effects.

Aqueous Detection Limit

0.03 $\mu\text{g/L}$ (Method 601)
4.1 $\mu\text{g/L}$ (Method 624)
10.0 $\mu\text{g/L}$ (Method 1624)
5.0 $\mu\text{g/L}$ (Method 8240)
0.3 $\mu\text{g/L}$ (Method 8010)

Non-Aqueous Detection Limit

5.0 $\mu\text{g/kg}$ (Method 8240)
0.3 $\mu\text{g/kg}$ (Method 8010)

17.5 REFERENCES

Note: The nonsequential numbers of the references reflect the order of references as they appear in the master bibliography.

6. Berkowitz, J.B.; Goyer, M.M.; Harris, J.C.; Lyman, W.J.; Horne, R.A.; Nelken, L.H.; Harrison, J.E.; Rosenblatt, D.H. 1978. Literature review - problem definition studies on selected chemicals. Volume II - Chemistry, toxicology and potential environmental effects of selected organic pollutants. Final Report, Contract No. DAMD17-77-C-7037. Fort Detrick, Frederick, MD: U.S. Army Medical Research and Development Command.
10. Callahan, M.A.; Slimak, M.W.; Gabel, N.W.; May, I.P.; Fowler, J.R.; Jennings, P.; Durfee, R.L.; Whitmore, F.C.; Maestri, B.; Mabey, W.R.; Holt, B.R.; Gould, C. 1979. Water-related environmental fate of 129 priority pollutants, Vol. I and II. Report No. EPA-440/4-79-029a and -029b, Washington, D.C.: U.S. Environmental Protection Agency, Office of Water Planning and Standards.

SECTION 10 EMERGENCY RESPONSE

EMERGENCY CONTACTS

In the event of any situation or unplanned occurrence requiring outside assistance or support services, the appropriate contacts(s) from the list below should be made.

Emergency Fire/ Police or Medical	911
Hayward Fire Department Non-Emergency	(510) 293-8690
Hayward Police Department Non-Emergency	(510) 293-7272
Poison Control Center	(800) 523-2222
Chem-Trec	(800) 424-9300

EMERGENCY PROCEDURES

All hazardous waste site activities present a degree of risk to onsite personnel. During routine operations, risk is minimized by establishing good work practices, staying alert, and using proper personnel protective equipment. Unpredictable events such as physical injury, chemical exposure, or fire may occur and must be anticipated.

Emergency conditions are considered to exist if:

- Any member of the field crew is involved in an accident or experiences any adverse effects or symptoms of exposure while onsite; or
- A condition is discovered that suggests the existence of a situation more hazardous than anticipated.

GENERAL EMERGENCY PROCEDURES

The following emergency procedures should be followed:

- In the event of an emergency, the contacts identified in the Emergency Contacts (above) listing shall be notified as necessary.
- In the event that a member of the field crew experiences any adverse effects or symptoms of exposure while on the scene, the entire field crew should immediately halt work and act according to the instructions provided by the Health & Safety officer.
- The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated, should result in the evacuation of the field team and re-evaluation of the hazard and associated protection level required.
- In the event that an accident occurs, the Health & Safety officer is to complete Accident Report Forms. Follow-up action should be taken to correct the situation that led to the accident.

CHEMICAL EXPOSURE

If any field crew member demonstrates symptoms of chemical exposure, the following procedures apply. At sites where two or more field crew members are involved, another team member (buddy) should remove the individual from the immediate area of contamination, **EXCEPT** in the case of a confined space unless appropriate PPE is afforded. At all sites, no matter how many personnel are involved, these procedures must be followed:

- Precautions should be taken to avoid exposure of other individuals to the chemical.
- If the chemical is on the individual's clothing, the clothing should be removed if it is safe to do so.
- If the chemical has contacted the skin, the skin should be washed with copious amount of water, preferably under a shower.
- In case of eye contact, an emergency eye wash should be used. Eyes should be washed for at least 15 minutes.
- If necessary, the victim should be transported to the nearest hospital or medical center. An ambulance should be called to transport the victim, if necessary.

PERSONAL INJURY

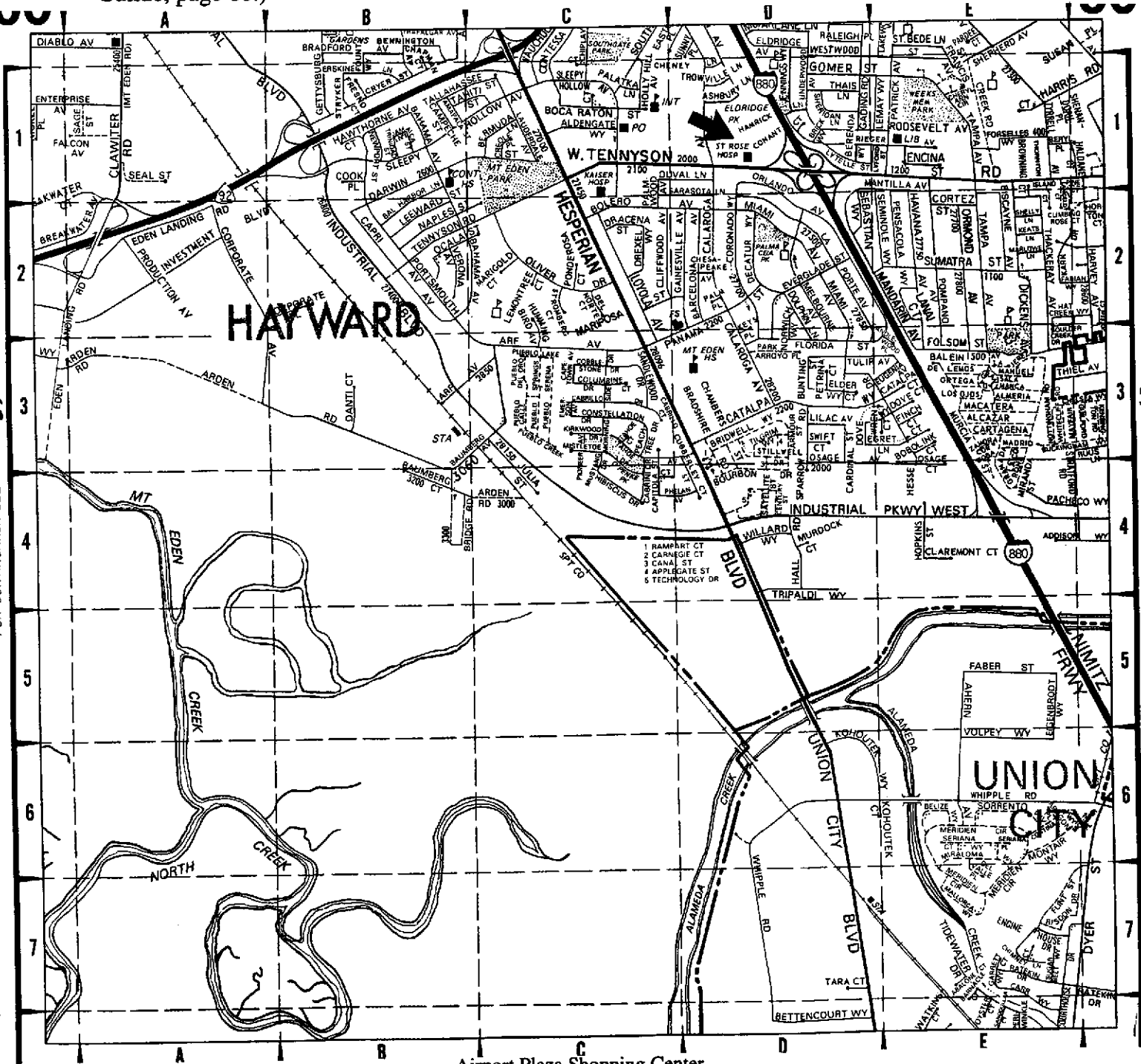
In case of personal injury at the site, the following procedures are to be followed:

- Field team members trained in first aid should administer treatment to an injured worker.
- The victim should then be transported to the nearest hospital or medical center. If necessary, an ambulance should be used to transport the victim.
- The project manager is responsible for making certain that accident report forms are completed. These forms are to be submitted to the Health & Safety officer. Follow-up action should be taken to correct the situation that caused the accident.

NEAREST HOSPITAL

**SAINT ROSE
27200 CALAROGA AVENUE
HAYWARD
510-264-4000**

DIRECTIONS: From the property, go south on Hesperian (towards Union City). At West Tennyson, turn left. The hospital is on your left (north) at I880. (Map--Base map, Thomas Guilde, page 60.)



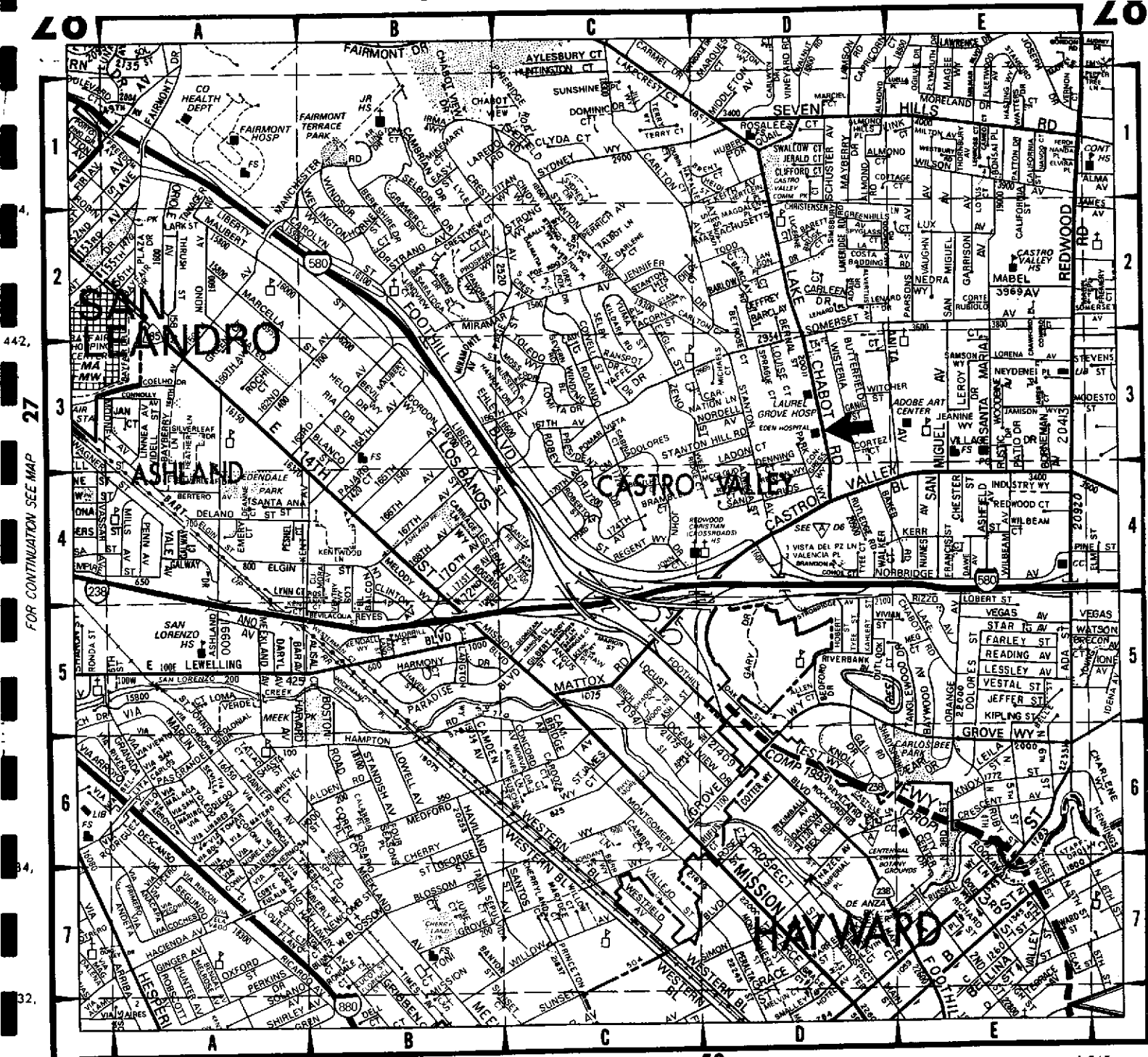
39 FOR CONTINUATION SEE MAP

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NEAREST TRAUMA CENTER

EDEN HOSPITAL
20103 LAKE CABOT ROAD
CASTRO VALLEY
510-537-1234

(Map--Base map, Thomas Guide, page 28)



FOR CONTINUATION SEE MAP 27

FOR CONTINUATION SEE MAP 58

1,530,

1,533,

1,542,

1,545,

Airport Plaza Shopping Center
Health & Safety Plan
94502.58
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