Woodward-Clyde Consultants

CONFIDENTIAL. PRIVILEGED
ATTORNEY CLIENT COMMUNICATION
AND ATTORNEY WORK PRODUCT.
RESTRICT DISTRIBUTION.

WORK PLAN
INITIAL SOIL INVESTIGATION
VERDESE CARTER PARK SITE CHARACTERIZATION

OAKLAND, CALIFORNIA

Prepared for

City of Oakland
City Attorney's Office
505 14th Street, 12th Floor
Oakland, CA 94612

April 20, 1993

Prepared by

Woodward-Clyde Consultants
500 12th Street, Suite 100
Oakland, CA 94607-4014

Woodward-Clyde Consultants

Engineering & sciences applied to the earth & its environment

April 20, 1993
93C0243A

CONFIDENTIAL. PRIVILEGED
ATTORNEY CLIENT COMMUNICATION
AND ATTORNEY WORK PRODUCT.
RESTRICT DISTRIBUTION.

Ms. Vivian O'Neal, Esq.
City of Oakland
City Attorney's Office
505 14th Avenue, 12th Floor
Oakland, CA 94612

Re: Work Plan for Phase I Soil Sampling
Verdese Carter Park Site Characterization Project
98th and Bancroft Avenues, Oakland

Dear Ms. O'Neal:

Woodward-Clyde Consultants (WCC) is pleased to submit this work plan to conduct an initial site characterization of Verdese Carter Park. The purpose of this investigation is to identify the general distribution of soil contamination, if any, in the shallow soil zone at the park.

This work plan presents the details of the proposed sampling and analysis program, including the rationale behind it, quality assurance measures which will be undertaken for the program, and a Health and Safety Plan for the proposed field activities.

It is a pleasure to be of service to the City. Please call me at 874-3288 if you have any questions.

Sincerely,

Michael McGuire, P.E.
Project Manager

Enclosure

Q:\93\13936.1(93C0243A)\1

M0421931038

500 12th Street, Suite 100 • Oakland, CA 94607-4014 • (510) 893-3600 • Fax (510) 874-3268

Woodward-Clyde Consultants

CONFIDENTIAL. PRIVILEGED
ATTORNEY CLIENT COMMUNICATION
AND ATTORNEY WORK PRODUCT.
RESTRICT DISTRIBUTION.

WORK PLAN
INITIAL SOIL INVESTIGATION
VERDESE CARTER PARK SITE CHARACTERIZATION

OAKLAND, CALIFORNIA

Prepared for

City of Oakland
City Attorney's Office
505 14th Street, 12th Floor
Oakland, CA 94612

April 20, 1993

Prepared by

Woodward-Clyde Consultants
500 12th Street, Suite 100
Oakland, CA 94607-4014

TABLE OF CONTENTS

1.0
INTRODUCTION

Woodward-Clyde Consultants has been retained by the City of Oakland to conduct a site characterization and remedial alternatives evaluation for the Verdese Carter Park site in Oakland, California. This work plan has been prepared to conduct an initial sampling and analysis program for the shallow soil zone beneath the site.

Section 1.0 of this work plan presents a summary of background information regarding the site and the objectives of the initial phase of the investigation. Section 2.0 contains a detailed discussion of the sampling program, including sampling and analysis rationale. Section 3.0 describes the detailed procedures that will be implemented in the field during sampling. This section contains information regarding drilling and sampling methodology, sample shipment and management of drill soil cuttings. Section 4.0 presents the Quality Assurance/Quality Control Plan for sampling and laboratory analysis activities to support generation of verifiable and legally defensible data. Finally, Appendix A contains the Health and Safety Plan for field activities to protect field personnel and the community during the field work.

1.1 BACKGROUND

Verdese Carter Park (the park) is located in Oakland, California between 98th and 96th Avenues and Bancroft Avenue and Sunnyside Street. The park covers approximately 3 acres. Low mounds, about 5 feet high, of grass-covered and tree-planted fill generally line the north, east, and southern perimeters of the park. The east side of the park is bordered by a dirt covered, undeveloped strip of land approximately 40 feet wide along the 98th Avenue frontage.

The park currently consists of a grassy field area on the eastern side of the park, while the western side of the park contains two basketball courts, a childrens' sandbox/playground area, and a community center/maintenance structure. The general layout of the park is presented on Figure 1.

The eastern portion of Verdese Carter Park was used by Autolite Corporation from 1951 to 1974 in the manufacturing of wet-cell batteries. Prior to 1975, the western portion of the park site was a separate parcel used as a greenhouse nursery; details of the history of nursery activities are currently not available. The City of Oakland (City) acquired the two adjacent properties circa 1975 and converted the site to a park in 1978.

Several soil sampling and analysis programs were performed in the 1970's to determine concentrations of lead in soil. Sampling was conducted by the City of Oakland (City), Alameda County Health Department (County), the California Department of Health Services (DHS), the University of California at Berkeley (UC), and by a private concerned citizens group. Elevated lead concentrations were measured in shallow soil samples collected in 1978 prior to the removal of contaminated soil discussed below. The approximate location of these sampling activities is shown on Plate 1.

In 1977, after acquisition of the Park, the City reportedly removed approximately 3,400 cubic yards of lead-contaminated soil from the site. In 1978, under the supervision of the DHS and County, approximately 1,700 yards of lead-contaminated soils located previously beneath the floor slab of the battery factory were reportedly removed to a depth of 12 inches, and replaced with 18 inches of clean soil. The approximate reported limits of the 1978 removal are indicated on Plate 1.

Recent observations at the Park have raised concerns that lead or other chemicals possibly remaining in soils may present environmental and health threats. In March of 1993, citizens reported observing a yellow-white precipitate substance in cracks in the asphalt basketball court area.

OBJECTIVES

The activities to be performed for this investigation are designed to provide a more complete characterization of potential contamination in soils at Verdese Carter Park. Specific objectives of the investigation are to:

- Investigate potentially elevated metals and acid concentrations in shallow soils and, if elevated metals concentrations are observed, initiate characterization defining the vertical and lateral extent of contamination.

- Provide a screening-level investigation of shallow native soils for pesticides and herbicides, based on historic usage of the western portion of the site as a nursery.

2.0
SITE SAMPLING PROGRAM

This section describes soil sample locations, rationale, and analytical suites. Soil sample locations may be adjusted in the field based on consultation with City of Oakland personnel and/or visible evidence of chemical contamination. If sample locations are adjusted, the sample objectives described below will be taken into consideration when selecting the new location. Approximate sample locations are shown in Figure 1. Procedures for sample collection are described in Section 3.0. Analytical methods are specified in Table 1.

For the purposes of this investigation, the park has been divided into two areas, as indicated on Figure 1. The areas are distinguished from each other based primarily on historical usage and, consequently, potential contaminants of concern.

The eastern portion of the park was the former site of a wet-cell battery factory and will be referred to as the 'Battery Factory Area'. Potential contaminants/parameters of concern in this area include metals and pH.

The western portion of the park is the site of a former nursery, and will be referred to as the 'Nursery Area'. Potential contaminants/parameters of concern in this area include metals and pH (as a result of proximity to the former battery factory), pesticides, and herbicides (the latter two possibly resulting from activities at the former nursery).

Soil sampling and analysis for each of the areas is discussed below.

2.1 NURSERY AREA SOIL SAMPLING LOCATIONS

Soil Boring Locations

Twelve soil borings will be advanced in the Nursery Area as shown on Figure 1. With certain exceptions, the proposed boring locations within the Nursery Area were selected to provide general area coverage. Exceptions include WCB-2(P), WCB-6(P), and WCB-7(P). WCB-2(P) is located in the immediate area where a precipitate-like substance was recently

observed in cracks in the basketball court pavement. WCB-6(P) and -7(P) are specifically located in the sandbox area; a high use area for children. These two sampling locations were chosen because children are particularly sensitive potential receptors for contaminants, and the area may also serve as a collection point for possible upwelling or "wicking" of subsurface contamination due to the sandbox area's reportedly poor drainage.

Soil samples will be collected from each boring at the following depth intervals beneath the fill soil imported for development of the park: 0.5-1.0 ft, 2.0-2.5 ft, 5.0-5.5 ft, 7.0-7.5 ft, and 10.0-10.5 ft. Soil samples will be selectively analyzed for the potential contaminants of concern, as follows:

Sample Analyses: Pesticides and Herbicides

Pesticide and herbicide analyses (EPA Methods 8080, 8140, and 8150) will be performed for soil samples from the 0.5 ft interval in the Nursery Area. If pesticide/herbicide contamination is confirmed from the 0.5 ft sample in any given boring, the 2.0 ft sample from the same boring will then be analyzed for the specific contaminants detected above.

Sample Analyses: Metals and pH

All soil samples will be analyzed for pH. A Title 22 metals scan by EPA Methods 6010/7000 series will be performed for all samples collected at 0.5 ft. Based on the results of these analyses, sequentially deeper samples will be analyzed according to the following criteria:

- If metals results for a given sample are below a criteria mutually agreeable between the City and the lead regulatory agency, no metals analyses will be performed on deeper samples.

- If metals results for a given sample are above the criteria, selective metals analyses will be performed on the remainder of the samples from the boring.

2.2 BATTERY FACTORY AREA SOIL SAMPLING LOCATIONS

Soil Boring Locations

Eight soil borings will be advanced in the Battery Factory Area as shown on Figure 2. The proposed boring locations within the Battery Factory Area, i.e., WCB-13(P) through -20(P), were selected in consideration of past and current site use, the results of previous sampling, and to provide appropriate area coverage. In terms of area coverage, the boring locations are biased away from the frontage along 98th Avenue, as Sanborn Map data shows that this area was occupied by "low-threat" office areas of the battery factory. The specific rationale for individual boring locations is:

WCB-13(P)	located in the barbeque area, a high-use area of the park for potential human receptors;
WCB-14(P)	located in an area that Sanborn Map data indicates as being formerly occupied by aboveground acid storage tanks;
WCB-15(P)	located near homeplate at the baseball diamond, a high use area of the park for potential human receptors;
WCB-16(P)	located where previous surface soil sampling detected a total lead concentration of 96,000 mg/kg, the highest ever detected at the site. The sampled soil was later removed, but this boring is proposed to confirm that the excavation was sufficiently deep; and
WCB-17(P) through-20(P)	located to provide general area coverage.

Soil samples will be collected from each boring at one depth within the fill material and at the following depth intervals beneath the fill soil imported for development of the park (and related contaminated soil removals as described in Section 1.0): 0.5-1.0 ft, 2.0-2.5 ft, 5.0-5.5 ft, 7.0-7.5 ft, and 10.0-10.5 ft. Soil samples will be selectively analyzed for the potential contaminants of concern, as follows:

Fill Sample Analyses

The samples at each location collected from within the fill will be analyzed for lead by EPA Method 6010.

Samples at 0.5 ft

The samples at each location at 0.5 ft beneath fill will be analyzed for pH and Title 22 metals (EPA Methods 6010 and 7000 Series).

Samples Deeper than 0.5 ft

Samples collected from below 0.5 ft will be analyzed for pH and will be selectively analyzed for Title 22 metals according to the criteria described for metals in the Nursery Area discussion, above.

2.3 QA/QC SAMPLING

In addition to the samples collected for chemical analysis, QA/QC samples will be collected. Descriptions of the QA/QC samples are detailed in Section 4.0.

3.0
FIELD PROCEDURES

This section describes the methods and procedures that will be used to collect soil samples; handle samples (containers, identification and labeling, preservation, shipping, and documentation and tracking); and handle investigation-derived waste (soil cuttings and well development water).

3.1 SOIL SAMPLE COLLECTION

Near-surface and subsurface soil samples will be collected from borings at the approximate locations shown in Figure 1.

Samples will be collected using auger drilling methods. The augers will be advanced to the transition between recent backfill and underlying native soil or older fill material. Given the difficulty in promptly ascertaining penetration of this transition when relying on observation of cuttings produced by continuous-flight augers, the transition will be located by continuous drive sampling. Continuous sampling will start approximately 18 inches above the expected depth of the transition, but will not continue more than 2 feet beneath the expected transition depth. Samples of soil will be obtained using a split-spoon modified California drive sampler equipped with 2-inch O.D. clean brass liners. Upon driving the sampler 18 inches, it will be withdrawn and the soil-filled liners will be removed. Each liner will be inspected to estimate the depth where the transition has been reached. The liner to be analyzed will be capped, labelled, sealed in a ziploc bag and placed into an ice-filled cooler.

All downhole equipment such as augers and continuous samplers will be steam-cleaned prior to use and between borings. The samplers will be cleaned prior to use in each sampling interval by washing in a solution of phosphate-free, laboratory-grade detergent and distilled water, and rinsing with distilled water.

The boring will be logged according to the Unified Soils Classification System by an experienced geologist or engineer.

Soil borings will be backfilled with cement grout or bentonite to surface grade.

Soil cuttings will be placed in drums pending proper disposal on receipt of analytical results.

3.2 SAMPLE HANDLING

Soil and water samples will be placed into the appropriate containers (as supplied by the subcontract analytical laboratory) and submitted for laboratory analysis. (Note that water samples will be submitted only for the QA/QC rinsate sample). Table 3-1 indicates the proper container and preservative, if required, for each type of sample and sample parameter.

All samples will be identified with a unique number. The samples will be labeled immediately after collection with the sample identification number, analytical parameter(s), date and time of sample collection, and any special handling instructions.

All soil and water samples will be placed in a chilled cooler immediately after collection for shipment to the analytical laboratory. Packing material will be used to prevent breakage of glass sample containers. Care will be taken to ship samples allowing ample time for laboratory handling and analysis before sample holding times expire. Samples will be shipped with leakproof ice-filled bags in sealed plastic or metal coolers using an overnight delivery service. Delivery to the laboratory will be within 48 hours of sample collection.

All samples will be handled and shipped under standard chain-of-custody protocols, described in Section 4.0. Samples will be shipped to a state certified laboratory.

3.3 INVESTIGATION-DERIVED WASTE HANDLING

Soil cuttings from each drilling location will be placed in drums at the location pending receipt of analytical results. Cuttings from other drilling locations will not be mixed in the same drum. Each drum will be labeled with the soil boring identification, depth interval from which the cuttings came, and the date the cuttings were produced. Proper disposal of soil cuttings will be determined from chemical analysis of soil samples collected from the boring. The City of Oakland will be the generator of record for the soil cuttings and related wastes.

Other non-hazardous waste (paper and plastic bags, rubber gloves, etc.) that is produced by field activities will be disposed using onsite waste receptacles.

4.0
QUALITY ASSURANCE/QUALITY CONTROL PLAN

This section is the quality assurance/quality control (QA/QC) plan.

4.1 QA OBJECTIVES FOR MEASUREMENT DATA IN TERMS OF PRECISION, ACCURACY, COMPLETENESS, AND REPRESENTATIVENESS

This section includes QA activities necessary to conduct the investigative program such that sufficient data of known high quality are collected. QC objectives to be met by the laboratory and field personnel are summarized below:

- Precision: Precision is determined by the degree of agreement between duplicate analyses of the same parameter in a given sample. Precision is calculated as the relative percent difference in duplicate analytical results:

$$RPD = \left(\frac{Result\ 1 - Result\ 2}{Average\ Result} \right) x\ 100$$

  Precision objectives for analytical methods will be established by the analyzing laboratory according to method protocols. The precision objectives are to be viewed as goals, not limits, as precision may be strongly influenced by sample matrix or other characteristics.

- Accuracy: Accuracy is defined by the degree of agreement between a measured value and a true or known value. Accuracy is determined using matrix spike samples. Matrix spike samples are samples into which known quantities of the parameter of interest have been added (or "spiked"). The samples are analyzed by the appropriate analytical method. The result obtained is compared to the known amount added, and the matrix spike recovery is calculated. This recovery is a measure of analytical accuracy:

  Accuracy objectives for analytical methods will be established by the analyzing laboratory according to method protocols. The accuracy objectives are to be

viewed as goals, not limits, as accuracy may be influenced by sample matrix or other characteristics.

- Completeness: Completeness is assessed by determining whether the reported information is sufficient for an individual to document the quality of the results. Completeness takes into account any breakage, laboratory errors, or sampling difficulties. The completeness objective is 90 percent. This objective is to be viewed as a goal, not a limit of completeness. All data shall be reported and any anomalous or missing data will be annotated in the submitted report.

- Representativeness: Representativeness is the degree to which data accurately and precisely represent the actual concentration of target parameters in the samples. Representativeness is a function of sample collection and analysis techniques. Sample collection methods are discussed in Section 4.2. Sample analysis methods were selected according to regulatory guidelines and are discussed in Section 4.5.

In order to meet the above objectives, a number of field and laboratory QC samples will be collected and analyzed. The field QC samples are discussed in Section 4.2. The laboratory QA/QC samples are discussed in Section 4.3.

4.2 SAMPLING QUALITY CONTROL AND CUSTODY PROCEDURES

Sampling Quality Control

Detailed, step-by-step procedures for collecting samples are described in Section 3.0. Sample collection methods and equipment were selected to obtain samples with a minimum potential for alteration of parameter values. Sample integrity (and thus representativeness) will further be assured by timely shipping and analysis of the samples. Methods of sample preservation and analysis are in accordance with guidelines described in the referenced laboratory protocols. Sample containers and the methods of preservation are summarized in Section 3.0.

The following field QC samples will be submitted for laboratory analysis:

- Rinsate Blank: A romsate blank will be generated by filling sampling equipment with reagent-grade deionized water, then pouring the water into sample containers and handling them with identical procedures used for water samples. The rinsate blank will be submitted to the laboratory under a fictitious name so that the analysts will not recognize it as a blank. The rinsate blank will be used to assess potential contamination from the sampling method.

- Field Duplicates: These will be duplicate samples collected from the same sampling location at the same time. The duplicate samples will be submitted to the laboratory under fictitious names so that the analysts will not recognize them as duplicates. These samples will be used to evaluate the precision of the sampling and analysis methods. Two field duplicates will be sampled and analyzed for all investigation parameters. Additional duplicates will be analyzed at a frequency of one per 10 samples for pH and for follow-on metal analyses (based on results of shallow sample analyses).

Sample Shipment

Samples will be transported to the laboratory within 48 hours of collection by project personnel. Chain-of-custody documentation will be maintained throughout shipment.

Sample Custody

Chain-of-custody records will be maintained for each sample collected. The chain-of-custody form will provide an accurate written record which can be used to trace the possession and holding of samples from the time of collection through data analysis and reporting. The following information will be specified for each sample on the chain-of-custody form:

- Sequential sample number
- Sample date
- Sample time

- Sample location and depth where appropriate
- Analyses to be performed

The chain-of-custody form will be signed by each participant in the sampling and handling procedures. It will be placed in a water-tight plastic bag and taped to the underside of the lid of the cooler containing the samples designated on the form. Upon arrival in the laboratory, samples will be received and inspected by the analytical laboratory representative. Samples contained in the shipment will be compared to the chain-of-custody form to ensure that all samples were received.

Field Documentation

In addition to the forms discussed above, field logbooks will also be used to document data collection activities. Entries will include as much detail as possible so that persons going to the site could reconstruct a particular situation without reliance on memory of the author.

Field logbooks will be bound field survey notebooks. Logbooks will be assigned to field personnel but will be stored in the field project file when not in use. Each logbook will be identified by a unique project-specific number. The title page of each notebook will contain:

- Person or organization to whom the book is assigned
- Book number
- Project name
- Start and end dates

The logbook will contain a variety of information including the date, starting and finishing time of activities, weather, and names of all sampling and/or investigative personnel present. All logbook entries shall be made in indelible ink, and each page initialed and dated by the sampler. The logbook entries shall include a full description of the sample, its origin, sampling time, date, and personnel. The sample will be assigned an identification code according to site-specific sample-naming protocols.

4.3 LABORATORY QUALITY CONTROL

Analytical Methods

Laboratory analyses will be performed in accordance with protocols described for the EPA methods referenced in Table 1.

Instrument Calibration

Instruments and equipment that measure a quantity, or whose performance is expected at an established level, are subject to calibration. Field equipment used for measurement data collection including pH meters, specific conductance meters, and organic vapor analyzers will be calibrated against appropriate standards prior to field use according to manufacturer's instructions. Calibration data will be recorded in the field logbook for the project, as well as the instrument or equipment logbook.

Laboratory equipment will be calibrated by laboratory personnel according to method protocols using reference standards, or will be externally by calibration agencies or equipment manufacturers. Calibration procedures and frequency of calibration will be recorded in appropriate logbooks, and will represent method-specified or industry-accepted techniques to ensure accurate sample monitoring, testing, and documentation as per QA/QC standards. All equipment will, at a minimum, be calibrated per the "manufacturer's directions." Additional calibration procedures for specific analytical instruments are provided in the referenced analysis protocols.

Method Blanks

Method blanks will be tested at the frequency specified in the method protocols, at least daily at the beginning of each analytical sequence. The method blank is used to quantify any observed contamination for target analytes. Method blank results will be reported separately from sample results. Sample results will not be blank corrected.

Spiked Samples and Duplicate Spiked Samples

The laboratory will analyze one spiked sample for every sample batch to provide an estimate of recovery and laboratory accuracy. A duplicate spiked sample will be analyzed each time that a spiked sample is analyzed to provide an estimate of laboratory precision. The samples will be spiked prior to extraction. The results will be reported as percent recovery. Spike percent recovery and duplicate recoveries will be compared to laboratory-established QA objectives for the purpose of evaluating analytical accuracy and precision. Should analytical results not meet these QA objectives, the laboratory will provide an explanation of the likely cause of noncompliance and any corrective actions taken.

Surrogate spikes will be utilized with each sample analysis performed in association with organic sample analyses (Methods 8080, 8140, and 8150). Surrogate spike recoveries will be compared to laboratory-established QA objectives for the purpose of evaluating accuracy and/or the need for corrective action.

4.4 PREVENTIVE MAINTENANCE

Sample collection equipment will be examined and tested prior to being put into service. All sample containers and equipment that will come in contact with samples will be visually checked for contamination prior to being used in the field. Equipment will be visually inspected for possible damage incurred during shipping, handling, or installation. Surfaces which can contact the sample will be examined for visible signs of contamination.

Sampling personnel will maintain a supply of key equipment items available in the field to prevent loss of data due to equipment malfunction. This includes, but is not limited to, pump components, tubing, fittings, sample containers, calibration standards, well sounding devices, bailers, and any required tools or cleaning equipment.

The analytical laboratory will maintain an adequate supply of critical equipment and analysis items. These include, but are not limited to, calibration standards, reagents, glassware, and analytical equipment.

4.5 DATA REDUCTION, VALIDATION, AND REPORTING

The field and laboratory data collected for the study will be reviewed to assure that data of satisfactory quality are used for interpretation. Upon receipt of all pertinent field and laboratory data, the Woodward-Clyde Consultants (WCC) Project Manager will initiate independent review of the data by qualified staff. The sections below detail these activities.

Data Evaluation

The laboratory chemical data will be reviewed and evaluated by a WCC chemist. The following data will be initially reviewed for each sample set:

- Method blanks
- Rinsate blanks
- Blind field duplicates
- Spiked recoveries (laboratory control sample, matrix, and surrogate spikes)
- Detection limits
- Holding times

Average precision, average accuracy, and completeness of data for the monitoring round will be determined using the formulae presented in Section 4.1. The results will be compared with the corresponding QA objective values. In addition, dates of sample extraction and analysis will be compared with sample collection dates to ensure that the samples were analyzed within the specified holding times.

Data Reporting

All laboratory analytical results (including results from QC samples) will be reported on laboratory forms. The laboratory forms will include laboratory and field sample designations, date of sample arrival at laboratory, date of extraction (if any), date of analysis, and method of analysis. The Laboratory QA/QC Officer will review each data sheet, sign and date it, and send it to a WCC designee.

After validating the data according to the procedures described in Section 4.5.1, data summaries will be prepared. Results from rinsate blanks, field duplicates, and laboratory duplicates will be included. Summaries of the calculations for precision, accuracy, and completeness will also be produced for possible inclusion in the final report. Copies of the field notes and laboratory data sheets, including those for QC samples, will be retained.

Complete laboratory data files will be maintained for a period of at least three years. The laboratory documentation will include all information pertaining to analysis of the samples including calibration data, raw analytical data, and laboratory notebooks and log books.

Quality Assurance Reports

Field data, signed laboratory data reports, and the results of data validation activities (Section 4.5.1) will be summarized by project staff and included as an attachment to the final data summary for the project. This attachment will be reviewed for completeness by the WCC Project Manager prior to finalizing the project report.

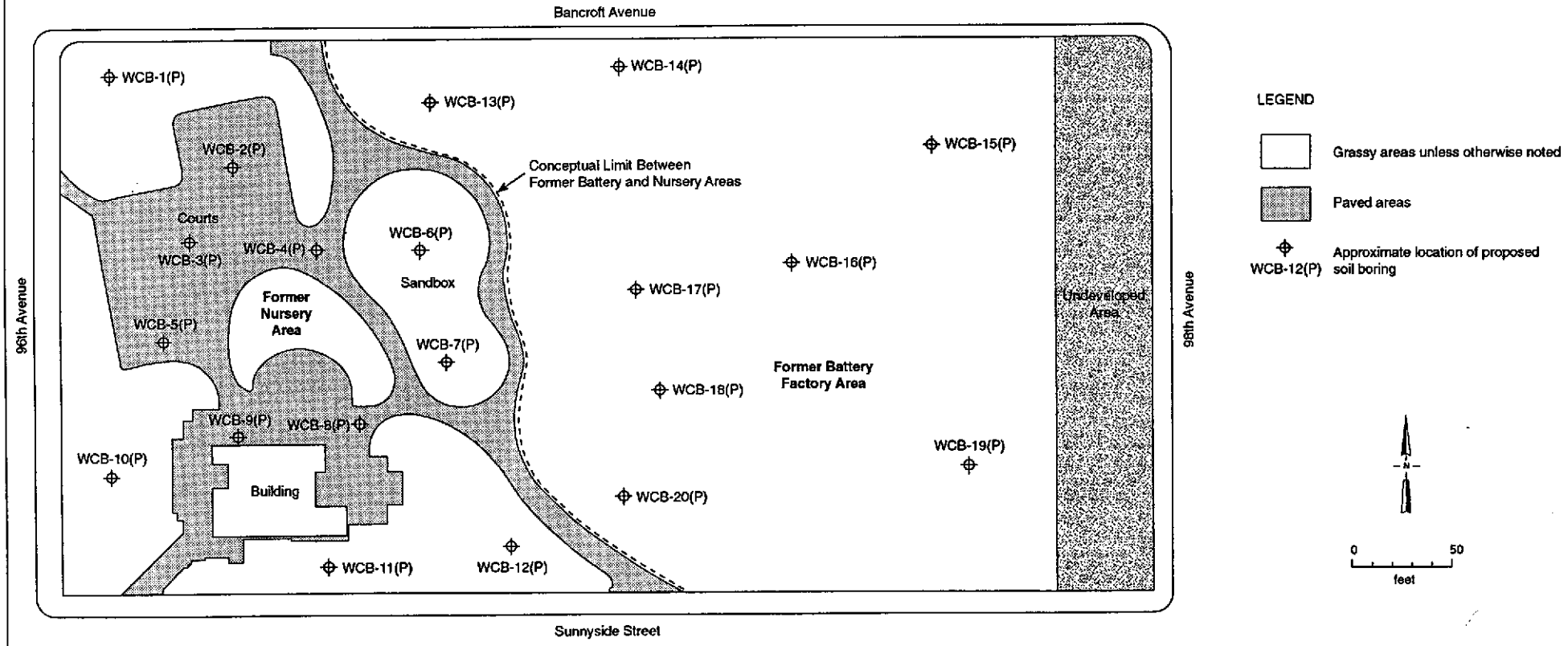
Corrective Action

Results from QC samples which do not achieve QA objectives, or results from samples which are unusual or unexpected, will be reviewed by the WCC Project Manager and the Laboratory QA/QC Officer. The possibility of transcription error or sample misidentification will be considered. A resolution will be made as to whether the analysis should be repeated or the results recalculated. Reanalysis may be performed after determination and correction of identified problems if sample holding time has not been exceeded. If necessary, a resampling in the field may be performed. Gas chromatograms, mass spectra, laboratory notebooks, or other laboratory data may be obtained and examined as necessary. The WCC Project Manager will review all corrective actions to ensure that resolution was achieved.

TABLE 1

SAMPLE CONTAINERS AND PRESERVATIVES

Analytical Suite	EPA Method Numbers and Descriptions	Soil Samples			Water Samples		
		Container	Preservative	Holding Time	Container	Preservative	Holding Time
Pesticides and Herbicides	8080 Organochlorine pesticides	16 ounce clear glass, or brass liner tube for full pesticide suite	Cool 4°C	14 days to extract; 40 days from extraction to analyze	6 x 1 liter amber glass	Cool 4°C	7 days to extract; 40 days from extraction to analyze
	8140 Organophosph. pesticides						
	8150 Chlorinated herbicides						
Title 22 Metals	Method 6010/7000 series.	8 ounce clear glass, or brass liner tube	Cool 4°C	28 days for mercury; 6 months for others	16 ounce poly	10 ml 20% HNO_3	28 days for mercury; 6 months for others
pH	150.1 pH	8 ounce clear glass, or brass liner tube	Cool 4°C	Immediately upon receipt	16 ounce poly	Cool 4°C	Immediately upon receipt



CONFIDENTIAL. PRIVILEGED
ATTORNEY CLIENT COMMUNICATION
AND ATTORNEY WORK PRODUCT.
RESTRICT DISTRIBUTION.

Project No. 93C0243A	Verdese Carter Park Oakland, California	SITE AND PROPOSED SAMPLE LOCATION PLAN PHASE 1 INVESTIGATION	Figure 1
Woodward-Clyde Consultants			

93C0243A-1000/04 1993

APPENDIX A
HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN

VERDESE CARTER PARK

98th Ave. and Bancroft Ave.

Oakland, California

Woodward-Clyde Consultants
500 12th Street, Suite 100
Oakland, California 94607-4014

April 16, 1993

Woodward-Clyde

HEALTH AND SAFETY PLAN
VERDESE CARTER PARK
SUBSURFACE INVESTIGATION
Project No. 93C-0243A

April 16, 1993

Site Safety Officer: to be determined

Approved Site Personnel: to be determined _____ _____

_____ _____

Valid Dates: 4/15/93 - 10/15/93

APPROVALS

_____ 4-20-93

Michael McGuire
Project Manager

Date

_____ 4-20-93

Jeff Mohn
Health and Safety Officer

Date

_____ _____

Anne Baptiste
Corporate Health and Safety

Date

TABLE OF CONTENTS

1.0
INTRODUCTION

This Site Health and Safety Plan delineates the basic safety requirements for the initial subsurface characterization work at Verdese Carter Park located in Oakland, California. This plan is intended for use in addition to Woodward-Clyde's Health and Safety Manual and Accident and Illness Prevention Program, copies of which will be located on site at all times. Implementation of this Site Safety Plan is the responsibility of the Project Manager. The Site Safety Officer will assist the Project Manager in carrying out this responsibility at the work site by enforcing the requirements of the Health and Safety Plan and by having the authority to suspend work to protect health and safety. The Operating Unit Health and Safety Officer may suspend or limit work practices being used that are deemed to be inadequate to ensure employee health and safety.

This plan may not be used for work other than that described in Section 3.0. It may not be modified or used beyond the expiration date shown on the title page without the written approval of the Operating Health and Safety Officer and the Corporate Health and Safety Officer.

2.0
SITE DESCRIPTION

Verdese Carter Park is located at 98th Avenue and Bancroft Avenue in Oakland, California (see Figure 1). The park has been closed due to possible environmental health and safety concerns regarding subsurface contamination at the park. Portions of the park were previously used to manufacture automobile batteries and were also used as a commercial nursery. Previous subsurface investigations have detected the presence of lead and zinc at elevated concentrations. Low pH (~ 2.0) was also detected in a precipitate substance. This investigation will involve drilling 20 soil borings to approximately 10 feet. The soil will be sampled for metals, pH, pesticides, and herbicides. Because of equipment and chemicals used during manufacturing, or previous operations, the potential for soil contamination exists.

3.0
DESCRIPTION OF WORK

To assess subsurface soil chemistry Woodward-Clyde Consultants proposes to drill 20 soil borings to approximately 10 feet. The approximate locations of the proposed borings are shown on the Site and Proposal Boring Location Plan (Figure 2). Samples will be tested for metals, pH, pesticides, and herbicides using EPA testing methods by State of California certified laboratories.

4.1 CHEMICAL HAZARDS

Previous soil studies at the site have identified some potential soil contaminants. At times in the past lead and zinc have been detected at elevated levels at the site. Historical data reviewed strongly suggests the presence of acidic ~~spills~~ soils on the site. Other possible contaminants of concern include pesticides and herbicides that may have been used in the nursery area. High concentrations of sulfur (approximately 50% of the sample) were detected in one suface sample obtained recently from the site.

4.1.1 Metals

The following metals have been historically found or are suspected to be present currently in the soil at the site. The primary route of entry for metals are through inhalation and dermal contact. Most are relatively nontoxic if ingested and mildly toxic by inhalation and skin contact. Some metals such as lead and mercury can cause central and peripheral nervous system disorders and damage. Long term exposure to lead has been shown to cause brain damage to children and adults, however, children are more sensitive to the effects of lead.

- Lead. Lead has been shown to cause damage to the central and peripheral nervous system. Lead exposure in dust and paint has been linked to brain and nervous system disorders in children. Long term exposure to lead can damage brain cells and nerve cells if ingested or inhaled. Acute toxic sysmptoms include ataxia, repeated vomiting, headache, stupor, hallucinations, tremros, convulsions, and coma. Lead has been historically detected in relatively high concentrations in the soil at the eastern protion of this site. Lead is a Class B2 carcinogen and is listed as a possible teratogen by the State of California.

- Zinc. Zinc has been shown to cause irritation, coughing, sweating, and dyspnea if zinc containing dust is inhaled. Zinc fumes can cause fever, nausia, and vomiting. Elevated zinc concentrations have been detected in a precipitate sampled at the site.

TABLE 1
METALS EXPOSURE DATA

Compound	Primary Route of Exposure	OSHA PEL (mg/m^3) (a)	ACGIH TLV (mg/m^3) (b)	Vapor Pressure In mm Hg
Lead	I, O, S	0.05	0.15	NA
Zinc oxide *	I, O	10.0	10.0	NA
Chromium	I, O, S	0.5	0.5	NA

(a): NIOSH Pocket Guide to Chemical Hazards, 1992
(b): Threshold Limit Values and Biological Exposure Indices, 1992
(C): Guide to Occupational Exposure Values - 1992
I: Inhalation
S: Skin
O: Oral
*: A PEL and TLV have not been established for zinc

4.1.2 Pesticides/Herbicides

Pesticide and herbicide use may have occured at the site from previous agricultural activities. No laboratory data is available on pesticide contamination, if any. Because of high levels of sulfur detected in one surface sample from the nursery area, pesticide contamination cannot be ruled out at this time. Sulfur is commonly used in the formulation of certain types of pesticides, and in the manufactoring of batteries. Sulfur as an element is nontoxic to humans and most animals.

4.1.3 Acids (pH)

Given the historical uses of the site, sulfuric acid used in battery manufactoring, may be present in subsurface soil at the site. Concentrated sulfuric acid can cause severe, deep burns to tissue. Contact with the eyes can cause permanent loss of vision. Inhalation can cause upper respiratory irritation, and may produce bronchitis and conjunctivities. Chemical reactions of sulfuric acid in the soil and groundwater can evolve hydrogen sulfide gas (H_2S).

4.2 PHYSICAL HAZARDS

The following physical hazards may be present during the project. The hazards are explained in the operating procedures, attached.

Heat Stress (Operating Procedure HS-102)
Drilling Safety (HS-509)

5.0
EXPOSURE MONITORING PLAN

5.1 DUST MONITORING

5.1.1 Monitoring Instruments

While drilling, sampling, or handling soil, a portable respirable dust monitor shall be used to monitor dust levels in the breathing zone. The dust monitor shall be sensitive to detect dust to approximately 0.05 mg/m^3.

5.1.2 Monitoring Guidelines

Dust monitoring should be performed as often as necessary and wherever necessary to protect field personnel from hazardous dust. Monitoring must be performed by individuals trained in the use and case of the required instruments. Because toxicity action levels are lower than visible dust levels, monitoring efforts should be focused on dust monitoring constantly for the first hour or longer.

During drilling or sampling operations, dust emissions may be measured continuously or periodically. If dust is measured continuously and the instrument must be unattended, the sample intake orifice, or in the case of instruments that operate by diffusion, the detector, must be positioned in a safe place downwind of the borehole or trench and instrument alarm set to sound at the action level.

If the alarm sounds while monitoring continuously dust concentrations, the sample intake orifice/detector should be moved so that dust concentrations in the breathing zone of individuals closest to the boring or trench are measured. Decisions regarding respirator use should be based on breathing zone dust concentrations. Measurements may be limited to breathing zone air.

5.2 PERSONNEL MONITORING

Personnel breathing zone will be monitored using the following instrument; portable respirable dust monitor sensitive to 0.05 mg/m^3.

Personnel breathing zone monitoring will be conducted during all drilling and sampling activities. Samples will be taken every 15 minutes by the Site Safety Officer or Geologist and recorded. During sampling and core logging the breathing zone shall be constantly monitored. If at any time readings above 0.05 mg/m^3 are encountered, all work will be stopped and work will be upgraded to level C protection. At levels above 40.0 mg/m^3 all work will be terminated and the situation reassessed.

5.2.1 Action Levels

Action levels (OSHA - Permissible Exposure Limits) are used to protect workers against a wide variety of health effects that could cause material impairment of health or functional capacity. This includes protection against catastrophic effects such as cancer, central nervous system damage, kidney and liver damage, respiratory effects, and sensory irritation.

Action levels are determined on a project by project basis. They are dependant on site conditions, both physical and chemical. Action levels are developed to protect site workers from chemical exposure, and take into account physical factors such as heat stress and low oxygen environments.

SITE SPECIFIC ACTION LEVELS

Air Purifying Respirators (APR) with combination HEPA and pesticide cartriges shall be donned if at anytime monitoring equipment detects dust concentrations in the breathing zone in excess of 4.0 mg/m^3. If dust concentrations in the breathing zone exceed 40.0 mg/m^3 all work shall be stopped and the HSO contacted.

5.2.2 Protection Factors

Respirator protection factors will be 10X for half-face respirators and 25X for full-face respirators equipped with a combination pesticide and particulate filter. Respirator protection limits can determined by multiplying the protection factor (10 - for half face respirators) by the PEL or TLV. Respirator limits (RLs) are based on the OSHA PEL and ACGIH TLV for lead and expected concentrations in the soil, which may be found throughout the site: RL = 10 X (4.0 mg/m^3) or **40.0 ppm**. If this level of **40.0 mg/m^3** is reached work must be stopped and respiratory effectiveness reevaluated.

Air-purifying respirators cannot be used in IDLH atmospheres or in atmospheres containing less than 19.5% oxygen by volume.

5.3 PERSONAL PROTECTIVE EQUIPMENT

Equipment listed below must be available on-site in appropriate sizes for use when needed.

- NIOSH-approved full- or half-face respirator with appropriate chemical cartridges (pesticide/HEPA). Respirators must be worn when Level C action levels are reached or exceeded.

- Uncoated, polyethylene or Saranex coated Tyvek coveralls. Coated coveralls must be worn when contact with wet or heavily contaminated soils may occur. The chemical risk assessment may further dictate the type of protective clothing required on site.

- Safety glasses or goggles. Eye protection must be worn when working with liquids or saturated soils and within 10 feet of operating heavy equipment. Eye protection must be splash-proof when handling liquids.

- Nitrile or neoprene gloves. Must be worn when contact with contaminated soil may occur.

- Neoprene or butyl rubber safety boots, calf-length. Must be worn when walking on obviously contaminated soil and when working within 10 feet of operating heavy equipment.

- Hard hat. Must be worn when working within 10 feet of operating heavy equipment.

- Ear plugs or muffs. Hearing protection shall be worn when noise levels exceed 85 dBA. If verbal communication with a person two feet away requires on to raise his/her voice to be heard, the level of background noise will usually be greater than 85 dBA.

5.4 WARNING LABELS

Warning labels shall be affixed to all drill cuttings and purged well water. The labels shall comply with the requirements of 29 CFR 1910.1200 (f) of OSHA's Hazard Communication standard, and shall include the following minimum information:

Date
Physical state (soil/water)
Location or Well ID
Name and signature of site manager

Drum labels will be provided by and will be affixed to all drums and materials generated during operations.

5.5 DECONTAMINATION

5.5.1 Personnel

Personnel engaged in drilling, soil and groundwater sampling shall decontaminate as follows:

Remove protective Tyvek clothing inside-out (roll-off body), boots, and gloves and deposit into labeled impermeable bags or containers, then remove respirators Employees shall wash their hands and faces prior to eating, drinking, or smoking.

See Operating Procedure HS-501 (attached)

NOTE: Respirators should be the last piece of personal protective equipment removed.

5.5.2 Equipment

Contaminated sampling equipment may be decontaminated by the method used to prevent cross-contamination of samples. Respirator face pieces must be wiped with a damp cloth and sanitized on the inside with alcohol swabs at the end of each work day or, if desired, fully decontaminated and sanitized by washing with manufacturer-recommended detergent, rinsinate in clean water, blot-drying then air-drying. Full decontamination/sanitization must be performed at least once a week.

Drilling equipment (augers and sampling equipment) will be steam cleaned between each boring using a predetermined bermed location at the site.

5.6 DUST CONTROL MEASURES

Dust shall be controlled in the drilling area and surrounding area to reduce exposure to workers and the general public. Dust shall be controled using water from hoses, pumps, or portable garden sprayers, which ever is approproiate. Dust should be reduced to a level that is not visible in the air around the work area.

5.7 SITE/COMMUNITY MONITORING

Because of the possibility the generation of dust during drilling activities, Woodward-Clyde will conduct air monitoring for dust. Monitoring samples will be taken at the site to assess dust levels and any hazards associated with the dust. Samples will be used to assess possible windborn migration from drilling activities.

Dust samples will be obtained using NIOSH approved methods and analysis protocol. Samples will be analyzed for total lead using a State of California Certified laboratory. Samples will be obtained using flow calibrated sample pumps equipped with disposable filters.

6.0
GENERAL HEALTH AND SAFETY REQUIREMENTS

6.1 MEDICAL CLEARANCES

Employees of W-C and its subcontractors assigned to perform work in the restricted area must have medical clearances. The only acceptable proof of clearance is a letter or document, signed by a physician, certifying that the physician performed an examination within the past 12 months and found the person physically fit to wear a respirator and perform work at hazardous waste sites.

6.2 HEALTH AND SAFETY TRAINING

Employees of WCC and its subcontractors assigned to perform work in the restricted area must meet 29 CFR 1910.120 requirements regarding 40-hour basic health and safety training, supervisor training and annual refresher training. Training is not required for employees of WCC and its subcontractors assigned to observe on-site activities from points outside the restricted area. Decisions as to whether or not a person needs training shall be made by the HSO.

6.3 HEALTH AND SAFETY BRIEFINGS

Each employee of WCC and its subcontractors assigned to perform the work described in Section 3.0 must be briefed on the health and safety requirements presented in this HSP by the WCC Site Safety officer, given a personal copy of this HSP, and requested to sign the attached Health and Safety Compliance Agreement. Individuals refusing to sign the agreement will not be permitted to work at the site. Completed agreements shall be delivered to the HSO. Additional briefings should be scheduled and conducted by the SSO as needed.

Briefings shall be conducted by the SSO or HSO and shall cover (1) work to be performed; (2) the chemical, physical and biological hazards associated with the work to be performed; (3) health effects that could result from overexposure to heat; (4)

treatment for heat stress; (5) methods of reducing exposure risks, including personal protective equipment, work zoning, decontamination, evacuation routes, action levels and smoking and eating restrictions; (6) emergency response procedures; and (7) chain of command. Each person shall be informed of the location of the nearest working telephone. In addition, selected individuals should be tested for understanding of the health and safety provisions of this HSP and unclear provisions re-explained. All steps described in this section must be repeated for each addition to the site team before each is permitted to begin work at the site.

Signed compliance agreements must be collected by the SSO and submitted to the HSO within 24 hours after they are signed.

6.4 BUDDY SYSTEM

Whenever work is being performed at the site by WCC or the drilling contractor, at least two employees of one or both firms must be present at the site. These employees must pair off and members of each pair must be in visual contact with each other at all times except during rest breaks. Both members of a pair must take rest breaks at the same time. This buddy system is necessary so that one members of each pair may provide assistance in the event the other is injured or becomes ill at the site.

7.0
AREA CONTROL

Access to hazardous and potential hazardous areas must be controlled to reduce the probability of physical injury and chemical exposure to field personnel, visitors, and the public. A hazardous or potentially hazardous area includes any area where (1) field personnel are required to wear respirators, (2) borings are being drilled with powered augers, or (3) excavating operations with heavy equipment are being performed.

The boundaries of hazardous and potentially hazardous areas must be identified by cordons, barricades, or emergency traffic cones or posts, depending on conditions. If such areas are left unattended, signs warning of the danger and forbidding entry must be placed around the perimeter if the areas are accessible to the public. Trenches and other large holes must be guarded with wooded or metal barricades spaced no further than 20 feet apart and connected with yellow or yellow and black nylon tape not less than 3/4-inches wide. The barricades must be placed no less than two feet from the edge of the trench.

Entry into hazardous areas shall be limited to individuals who must work in those areas. Unofficial visitors must not be permitted to enter hazardous areas while work in those areas is in progress. Official visitors should be discouraged from entering hazardous areas, but may be allowed to enter only if they agree to abide by the provisions of this document, follow orders issued by the site safety officer, and are informed of the potential dangers that could be encountered in the areas.

7.1 VISITORS

Visitors shall not be allowed to enter restricted work zones unless they are made aware of WCC's health and safety requirements for individuals authorized to enter restricted zones, agree to comply with the requirements and demonstrate the ability to comply.

All personnel must be authorized to work in the controlled area. Personnel must have proof of proper hazardous waste training and an adequate medical surveillance program

that complies with the requirements of OSHA 29 CFR Part 1910 (e) and (f) and CAL/OSHA Title 8, Chapter 4 (e) and (f).

7.2 POSTINGS

The following items (all attached) must be posted, or available in the work area:

1. Emergency telephone numbers
2. Directions to the nearest emergency hospital (Figure 3)
3. Site Vicinity Map (Figure 1)
4. Health and Safety Equipment Checklist
5. Chemical Warning Concentrations List
6. Incident Report Form HS-502
7. Air Monitoring Data Sheet
8. OSHA poster
9. Boring Location Map (Figure 2)
10. Proposition 65 Chemical List

8.0
REPORTS

Health and safety infractions and accidents resulting in illness or injury or property damage must be reported to WCC health and safety authorities. Reporting procedures are described in health and Safety Operating Procedure No. HS-502 (attached).

Upon completion of the work described in this HSP, a safety completion report must be submitted to the HSO. The report shall contain an evaluation of this HSP an a summary of health and safety activities, including airborne chemical monitoring data, decisions based on the data, and names of WCC and subcontractor personnel who worked or visited the work site.

9.0
EMERGENCY PROCEDURES

In the event of an injury accident, exposure results in illness or other bodily harm, go to the nearest telephone and dial 9-1-1 and ask for emergency assistance. Describe the injury or illness and answer all questions asked by the person answering the telephone. Do not hang up until the other person hangs up.

If the injury or illness appears minor, the affected person may be driven to the nearest emergency hospital. The emergency ward of the hospital should be contacted while the affected person is in enroute and informed that the person will be arriving. Inform the hospital of the nature of the illness or injury. The name, address and telephone number of and the directions to the nearest emergency hospital are:

Humana Hospital - San Leandro
13855 East 14th Street
San Leandro, California
(510) 667-4565

Directions to Hospital: See Figure C-1

Ambulance: 911

Fire Department: 911 or

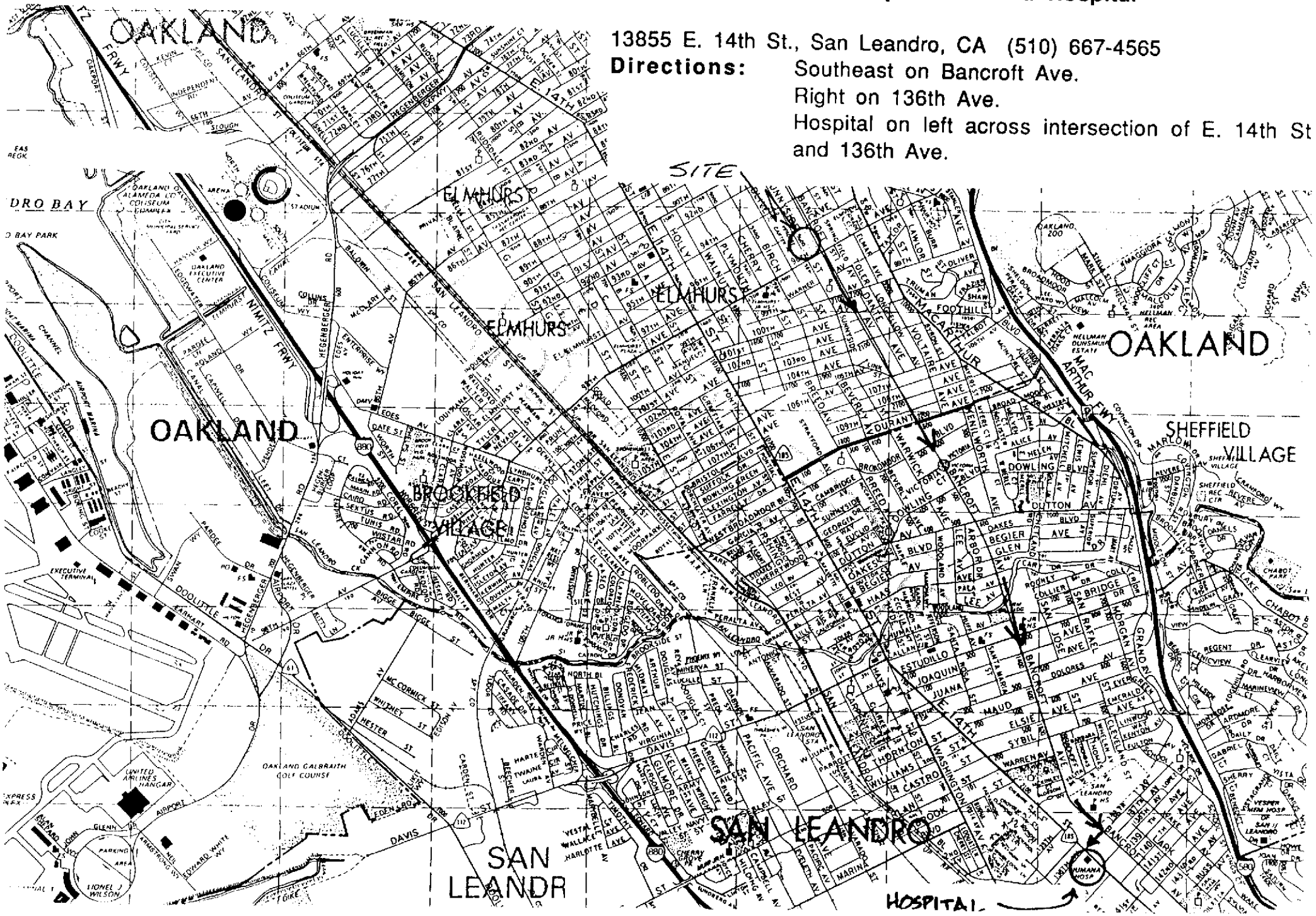
Police Department: 911

Woodward-Clyde Consultants:(510) ~~874-3000~~ 893-3600 or (408) 297-9585 (Jeff Mohn)
Michael McGuire (WC Project Manager): (510) 874-3288 (direct line)

Figure C-1. Route Map to Humana Hospital

13855 E. 14th St., San Leandro, CA (510) 667-4565

Directions: Southeast on Bancroft Ave.
Right on 136th Ave.
Hospital on left across intersection of E. 14th St and 136th Ave.



10.0
REFERENCES

1. Klaassen, C.; Amdur, M.; and Doull, J.; Casarett and Doull's Toxicology, Third Edition, Macmillan Publ., New York, 1986.

2. Windholz, M.; et. al.; The Merk Index, Tenth Edition, Merk & CO., Inc., Rahway, N.J., 1983.

3. Hodgson, E.; Levi, P.; Modern Toxicology, Elsivier Science Publishing Co., Inc., New York, New York, 1987.

4. Sax, Irving and Lewis, R.; Dangerous Properties of Industrial Materials, Seventh Edition, Volume III, Van Nostrand Reinhold, New York, 1989.

5. American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances in the Work Environment, 1984 - 1985.

6. Olishifski, J.B., Fundamentals of Industrial Hygiene, National Safety Council, 1983.

7. National Institute for Occupational Safety and Health, The Industrial Environment, Its Evaluation and Control, 1973.

102.0 HEAT STRESS

102.1 PURPOSE

The purpose of this OP is to provide general information on heat stress and the methods that can be utilized to prevent or minimize the occurrence of heat stress.

Adverse climatic conditions are important considerations in planning and conducting site operations. Ambient temperature effects can include physical discomfort, reduced efficiency, personal injury, and increased accident probability. Heat stress is of particular concern while wearing impermeable protective garments, since these garments inhibit evaporative body cooling.

102.2 REQUIREMENTS

The NIOSH criteria document for heat stress recommends that environmental monitoring and other preventive measures be adopted in hot work environments. However, the provisions are not directly applicable to employees who are required to wear impermeable protective clothing. The reason for this exception is that impermeable clothing prevents the evaporation of sweat, which is one of the most important cooling mechanisms of the body. There is no recognized health standard protection for workers wearing impermeable protective clothing and respirators in hot environments.

The ACGIH has adopted a TLV for heat stress. These guides relate to work/rest regimes.

102.3 ADDITIONAL HAZARD

The use of Personal Protective Equipment of the types commonly used for hazardous waste work can place stress on the body. One common problem with the use of personal protective equipment, especially in hot environments, is heat stress. Protective clothing can cause excessive sweating and can prevent the body from properly regulating body temperature.

102.4 TYPES OF HEAT STRESS

Heat stress is the aggregate of environmental and physical work factors that constitute the total heat load imposed on the body. The environmental factors of heat stress are the air temperature, radiant heat exchange, air movement, and water vapor pressure. Physical work contributes to the total heat stress of the job by producing metabolic heat in the body in proportion to the intensity of the work. The amount and type of clothing also affect the heat stress.

Heat strain is the series of physiological responses to heat stress. When the strain is excessive for the exposed individual, a feeling of discomfort or distress may result, and, finally, a heat disorder may ensue. The severity of strain will depend not only on the magnitude of the prevailing stress, but also on the age, physical fitness, degree or acclimatization, and dehydration of the worker.

Heat disorder is a general term used to describe one or more of the following heat-related disabilities or illnesses:

- Heat Cramps - painful intermittent spasms of the voluntary muscles following hard physical work in a hot environment. Cramps usually occur after heavy sweating, and often begin at the end of a work shift.

- Heat Exhaustion - profuse sweating, weakness, rapid pulse, dizziness, nausea, and headache. The skin is cool and sometimes pale and clammy with sweat. Body temperature is normal or subnormal. Nausea, vomiting, and unconsciousness may occur.

- Heat Stroke - sweating is diminished or absent. The skin is hot, dry, and flushed. Increased body temperature, which, if uncontrolled, may lead to delirium, convulsions, coma, and even death. Medical care is urgently needed.

102.5 METHODS OF CONTROLLING HEAT STRESS

As many of the following control measures as are appropriate to site conditions should be utilized to aid in controlling heat stress:

- Provide for adequate liquids to replace lost body fluids and replace water and salt lost from sweating. Encourage personnel to drink more than the amount required to satisfy thirst. Thirst

satisfaction is not an accurate indicator of adequate salt and fluid replacement.

- Replace fluids with water, commercial mixes such as Gatorade or Quick Kick, or a combination of these.
- Establish a work regimen that will provide adequate rest periods for cooling down. This may require additional shifts of workers.
- Wear cooling devices such as vortex tubes or cooling vests beneath protective garments.
- Take all breaks in a cool rest area (77°F is best).
- Remove impermeable protective garments during rest periods.
- Do not assign other tasks to personnel during rest periods.
- Inform personnel of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress.

102.6 MONITORING

102.6.1 TEMPERATURE

The heat stress of an area can be monitored by the Wet Bulb Globe Temperature Index (WBGT) technique. Where heat stress is a possibility, a heat stress monitoring device, such as the Wibget Heat Stress Monitor (Reuter Stokes) can be utilized.

The WBGT shall be compared to the Threshold Limit Values (TLV) outlined by the ACGIH TLV guides, and a work-rest regiment can be established in accordance with the WBGT. Note that 5 degrees C must be subtracted from the TLVs for heat stress listed to compensate for the wearing of impermeable protective clothing.

102.6.2 MEDICAL

In addition to the provisions of the WCC medical surveillance program, on-site medical monitoring of personnel should be performed by qualified medical personnel for projects where heat stress is a major concern. Blood pressure, pulse, body temperature (oral), and body weight loss should be taken and recorded.

Heart Rate: Count the radial pulse during a 30-second period as early as possible in the rest period. If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the same. If the heart rate still exceeds 110 beats per minute at the next rest cycle, shorten the following work cycle by one-third.

Oral Temperature: Use a clinical thermometer or similar device to measure the oral temperature at the end of the work period (before drinking liquids). If the oral temperature exceeds 99.6F (37.6C), shorten the next work cycle by one-third without changing the rest period. If the oral temperature still exceeds 99.6F (37.6C) at the beginning of the next rest period, shorten the following work cycle by one-third.

Do not permit a worker to wear a semipermeable or impermeable garment if his/her oral temperature exceeds 100.6F (38.1C).

Body Water Loss: Measure body weight on a scale accurate to ± 0.25 pounds at the beginning and end of each work day (also lunch break, if possible) to see if enough fluids are being taken to prevent dehydration. Weights should be taken while the employee wears similar clothing or, ideally, nude. The body water loss should not exceed 1.5 percent total body weight loss in a work day.

Portable water and Gatorade or other electrolyte replacement fluid should be available. Workers should be encouraged to drink fluids during rest periods.

Physiological Monitoring: Initially, the frequency of physiological monitoring depends on the air temperature adjusted for solar radiation and the level of physical work (see Table 2). The length of the work cycle will be governed by the frequency of the required physiological monitoring.

102.7 REFERENCES

American Conference of Governmental Industrial Hygienists, Threshold mit Values for Chemical Substances in the Work Environment, 1984 - 1985.

Olishifski, J.B., Fundamentals of Industrial Hygiene, National Safety Council, 1983.

National Institute for Occupational Safety and Health, The Industrial Environment, Its Evaluation and Control, 1973.

509.0 SAFETY GUIDELINES FOR DRILLING INTO SOIL AND ROCKS

509.1 PURPOSE

The purpose of this operating procedure is to provide guidelines for safe conduct of drilling operations with truck-mounted and other engine-powered, drill rigs. The procedure addresses off-road movement of drill rigs, overhead and buried utilities, use of augers, rotary and core drilling, and other drilling operations and activities.

509.2 APPLICATION

The guidelines shall be applied in all WCC/WCFS projects in which truck-mounted, or other engine-powered, drill rigs are used. The guidelines are applicable to WCC employees and WCC aware rigs. For drill rigs operated by contractors, drill rig safety is the responsibility of the contractor.

509.3 RESPONSIBILITY AND AUTHORITY

Drill rig safety and maintenance is the responsibility of the drill rig operator.

509.4 SAFETY GUIDELINES

509.4.1 MOVEMENT OF DRILL RIGS

Before moving a rig, the operator must do the following:

1. To the extent practical, walk the planned route of travel and inspect it for depressions, gullies, ruts, and other obstacles.

2. Check the brakes of the truck/carrier, especially if the terrain along the route of travel is rough or sloped.

3. Discharge all passengers before moving on rough or steep terrain.

4. Engage the front axle (on 4x4, 6x6, etc. vehicles) before traversing rough or steep terrain.

Driving drill rigs along the sides of hills or embankments should be avoided; however, if side-hill travel becomes necessary, the operator must conservatively evaluate the ability of the rig to remain upright while on the hill or embankment. The possibility that the presence of drilling tools on the rig may reduce the ability of the rig to remain upright by raining the center of mass of the rig must be considered.

Logs, ditches, road curbs, and other long and horizontal obstacles should be normally approached and driven over squarely, not at an angle.

When close lateral or overhead clearance is encountered, the driver of the rig should be guided by another person on the ground.

Loads on the drill rig and truck must be properly stored while the truck is moving, and the mast must be in the fully lowered position.

After the rig has been positioned to begin drilling, all brakes and/or locks must be set before drilling begins. If the rig is positioned on a steep grade and leveling of the ground is impossible or impractical, the wheel of the transport vehicle should be blocked and other means of preventing the rig from moving or topping over employed.

509.5 BURIED AND OVERHEAD UTILITIES

The location of overhead and buried utility lines must be determined before drilling begins, and their locations should be noted on boring plans or assignment sheets.

When overhead power lines are close by, the drill rig mast should not be raised unless the distance between the rig and the nearest power line is at least 20 feet or other

distance as required by local ordinances, whichever is greater. The drill rig operator or assistant should walk completely around the rig to make sure that proper distance exists.

When the drill rig is positioned near an overhead line, the rig operator should be aware that hoist lines and power lines can be moved towards each other by wind. When necessary and approved by the PM and the utility, power lines may be shielded, shut down, or moved by the appropriate personnel.

509.6 CLEARING THE WORK AREA

Before a drill rig is positioned to drill, the area on which the rig is to be positioned should be cleared of removable obstacles and the rig should be leveled if sloped. The cleared/leveled area should be large enough to accommodate the rig and supplies.

509.7 SAFE USE OF AUGERS

Never place hands or fingers under the bottom of an auger flight or drill rods when hoisting the augers or rods over the top of another auger or rod in the ground or other hard surfaces, such as the drill rig platform.

Never allow feet to get under the auger or drill rod while they are being hoisted.

When drill is rotating, stay clear of the drill string and other rotating components of the drill rig. Never reach behind or around a rotating auger for any reason.

Move auger cuttings away from the auger with a long-handled shovel or spade; never use hands or feet.

Never clean an auger attached to the drill rig unless the transmission is in neutral or the engine is off, and the auger has stopped rotating.

509.8 SAFE USE OF HAND TOOLS

OSHA regulations regarding hand tools should be observed in addition to the guidelines provided below:

1. Each tool should be used to perform tasks for which it was originally designed.

2. Damaged tools should be repaired before use or discarded.

3. Safety goggles or glasses should be worn when using a hammer or chisel. Nearby co-workers and by-standers should be required to wear safety goggles or glasses also or to move away.

4. Tools should be kept cleaned and stored in an orderly manner when not in use.

509.9 SAFE USE OF WIRE LINE HOISTS, WIRE ROPE, AND HOISTING HARDWARE

Safety rules described in 29 CFR 1926.552 and guidelines contained in the Wire RPE User's Manual published by the American Iron and Steel Institute shall be used whenever wire line hoists, wire rope, or hoisting hardware are used.

509.10 PROTECTIVE GEAR

509.10.1 MINIMUM PROTECTIVE GEAR

Items listed below should be worn by all members of the drilling team while engaged in drilling activities.

- Hard Hat;
- Safety Shoes (shoes or boots with steel toes and shanks); and
- Gloves.

509.10.2 OTHER GEAR

Items listed below should be worn when conditions warrant their use. Some of the conditions are listed after each item.

1. Safety Goggles or Glasses: Use when (1) driving pins in and out of drive chains, (2) replacing keys in tongs, 3) handling hazardous chemicals, (4) renewing or tightening gauge glasses, (5) breaking concrete, brick, or cast iron, (6) cleaning material with chemical solutions, (7) hammering or sledging on chisels, cold cuts, or bars, (8) cutting wire lines, (9) grinding on abrasive wheels, (10) handling materials in powered or semi-powered form, (11) scraping metal surfaces, (12) sledging rock bits or core heads to tighten or loosen them, (13) hammering fittings and connections, and (14) driving and holding rivets.

2. Safety Belts and Lifelines: Safety belts and lifelines should be worn by all persons working on top of an elevated derrick beam. The lifeline should be secured at a position that will allow a person to fall no more than eight feet.

3. Life Vests: Use for work over water.

509.11 TRAFFIC SAFETY

Drilling in streets, parking lots or other areas of vehicular traffic requires definition of the work zones with cones, warning tape, etc. and compliance with local police requirements.

509.12 FIRE SAFETY

1. Fire extinguishers shall be kept on or near drill rigs for fighting small fires.

2. If methane is suspected in the area, a combustible gas instrument (CGI) shall be used to monitor the air near the borehole with all work to stop at 25 percent of the Lower Explosive Limit.

3. Work shall stop during lightning storms.

HEALTH AND SAFETY COMPLIANCE AGREEMENT

I, the undersigned, have received a copy of the health and safety plan for the project identified below. I have read the plan, understand it, and agree to comply with all of the health and safety requirements therein. I understand that I may be prohibited from continuing work on the project for failing to comply.

I have __ have not __ (check one) been briefed by a project safety authority on the health and safety requirements of the project.

Project No. _____

Project Title _____

Date of Plan _____

_____
Print Name

_____
Signature

_____
Firm

_____
Date

HEALTH AND SAFETY COMPLIANCE AGREEMENT

I, the undersigned, have received a copy of the health and safety plan for the project identified below. I have read the plan, understand it, and agree to comply with all of the health and safety requirements therein. I understand that I may be prohibited from continuing work on the project for failing to comply.

I have __ have not __ (check one) been briefed by a project safety authority on the health and safety requirements of the project.

Project No. _____

Project Title _____

Date of Plan _____

_____
Print Name

_____
Signature

_____
Firm

_____
Date

HEALTH AND SAFETY COMPLIANCE AGREEMENT

I, the undersigned, have received a copy of the health and safety plan for the project identified below. I have read the plan, understand it, and agree to comply with all of the health and safety requirements therein. I understand that I may be prohibited from continuing work on the project for failing to comply.

I have __ have not __ (check one) been briefed by a project safety authority on the health and safety requirements of the project.

Project No. _____

Project Title _____

Date of Plan _____

_____
Print Name

_____
Signature

_____
Firm

_____
Date

HEALTH AND SAFETY COMPLIANCE AGREEMENT

I, the undersigned, have received a copy of the health and safety plan for the project identified below. I have read the plan, understand it, and agree to comply with all of the health and safety requirements therein. I understand that I may be prohibited from continuing work on the project for failing to comply.

I have __ have not __ (check one) been briefed by a project safety authority on the health and safety requirements of the project.

Project No. _____

Project Title _____

Date of Plan _____

_____
Print Name

_____
Signature

_____
Firm

_____
Date

Woodward-Clyde Consultants

HEALTH AND SAFETY EQUIPMENT CHECKLIST

Project Name: Carter Part Project Number: 93C0243A

The checked items shall be present on site:

- [X] Eye Protection
- [X] Hard Hat
- [X] Safety Shoes/Boots
- [X] Hearing Protection
- [X] First Aid Kit
- [ ] Eye Wash
- [X] Fire Extinguisher
- [ ] Splash Shield
- [ ] Splash Apron
- [ ] Dust Mask
- [X] Respirator (Half-face APR)
- [ ] Respirator (Full-face APR)
- [ ] Airline System
- [ ] SCBA
- [X] Cartridges
  - [ ] Organic Vapor (color coded black)
  - [ ] Acid Gases and Organic Vapor (color coded yellow)
  - [ ] Dust and Mists (filter pad with cover)
  - [X] HEPA (color coded purple)
  - [ ] Combination- Acid gas, organic vapor and HEPA (color coded yellow/purple)
  - [X] Other Specify: Pesticides
- [X] Decontamination Equipment (See Operating Procedure HS-512)
  - [X] Buckets
  - [X] Scrub Brushes
  - [X] Detergent (Alconox)
  - [ ] Plastic Sheeting
  - [ ] Paper Towels
  - [X] Hand Soap
- [ ] HNu
- [ ] OVA
- [ ] Combustible Gas Meter
- [X] ~~Sensidyne or Drager Tubes and Pump~~ Specify: Dust Meter
- [ ] Barricades/Pylons
- [ ] Barricade Tape
- [ ] "Authorized Personnel Only" signs
- [X] Latex Gloves
- [ ] Nitrile Gloves
- [ ] Neoprene Gloves
- [ ] Leather Gloves
- [X] Uncoated Tyvek
- [ ] Polylaminated Tyvek
- [ ] Saranex coated Tyvek
- [ ] Boot Covers
- [ ] Duct Tape

Woodward-Clyde Consultants

Page ____ of ____

AIR MONITORING DATA SHEET

Site or Project Name _____ Project No. _____ Date: _____

Person(s) Collecting Data _____

General Operation and Location at Site _____

Instrument Type, Make, Model _____

Instrument Serial or ID No. _____ Battery Check Results _____

Date of Last Calibration or Check _____ Date of Last Service _____

Contaminant(s) Suspected _____

	Specific Location	Specific Operation or Work Phase	Employee Name if Breathing Zone Monitored	Time	Reading	Comments (e.g., duration, causation of reading)
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

General Comments: _____

_____

_____

Signature of Person Responsible for Data: _____ Date Signed _____

STATE OF CALIFORNIA
HEALTH AND WELFARE AGENCY
SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986

CHEMICALS KNOWN TO THE STATE TO CAUSE CANCER OR REPRODUCTIVE TOXICITY

he Safe Drinking Water and Toxic Enforcement Act of 1986 requires that the Governor evise and republish at least once per year the list of chemicals known to the State to ause cancer or reproductive toxicity. The identification number indicated in the ollowing list is the Chemical Abstracts Service (CAS) Registry Number. No CAS number is iven when several substances are presented as a single listing. The date refers to the nitial appearance of the chemical on the list.

CHEMICALS KNOWN TO THE STATE TO CAUSE CANCER

emical	CAS Number	Date
alpha-C (2-Amino-9H-pyrido[2,3-b]indole)	26148685	January 1, 1990
etaldehyde	75070	April 1, 1988
etamide	60355	January 1, 1990
etochlor	34256821	January 1, 1989
Acetylaminofluorene	53963	July 1, 1987
ifluorfen	62476599	January 1, 1990
rylamide	79061	January 1, 1990
rylonitrile	107131	July 1, 1987
tinomycin D	50760	October 1, 1989
lriamycin (Doxorubicin hydrochloride)	23214928	July 1, 1987
-2-[2-(2-furyl)-3-(5-nitro-2-furyl)]acrylamide	3688537	July 1, 1987
latoxins	---	January 1, 1988
lachlor	15972608	January 1, 1989
lcoholic beverages, when associated with alcohol abuse	---	July 1, 1988
ldrin	309002	July 1, 1988
llyl chloride	107051	January 1, 1990
Aminoanthraquinone	117793	October 1, 1989
Aminoazobenzene	60093	January 1, 1990
tho-Aminoazotoluene	97563	July 1, 1987
Aminobiphenyl (4-aminodiphenyl)	92671	February 27, 1987
Amino-9-ethylcarbazole hydrochloride	6109973	July 1, 1989
Amino-2-methylanthraquinone	82280	October 1, 1989
Amino-5-(5-nitro-2-furyl)-1,3,4-thiadiazole	712685	July 1, 1987
mitrole	61825	July 1, 1987
algesic mixtures containing phenacetin	---	February 27, 1987
lline	62533	January 1, 1990
tho-Anisidine	90040	July 1, 1987
tho-Anisidine hydrochloride	134292	July 1, 1987
timony oxide (Antimony trioxide)	1309644	October 1, 1990
senite	140578	July 1, 1987
senic (inorganic arsenic compounds)	---	February 27, 1987
bestos	1332214	February 27, 1987
zaine	492808	July 1, 1987
serine	115026	July 1, 1987
athioprine	446865	February 27, 1987
nobenzene	103333	January 1, 1990
Benz[a]anthracene	56553	July 1, 1987
Benzene	71432	February 27, 1987
Benzidine [and its salts]	92875	February 27, 1987
Benzo[b]fluoranthene	205992	July 1, 1987
Benzo[j]fluoranthene	205823	July 1, 1987
Benzo[k]fluoranthene	207089	July 1, 1987
Benzofuran	271896	October 1, 1990
Benzo[a]pyrene	50328	July 1, 1987
Benzotrichloride	98077	July 1, 1987
Benzyl chloride	100447	January 1, 1990
Benzyl violet 4B	1694093	July 1, 1987
Beryllium and beryllium compounds	---	October 1, 1987
Betel quid with tobacco	---	January 1, 1990
Bis(2-chloroethyl)ether	111444	April 1, 1988
N,N-Bis(2-chloroethyl)-2-naphthylamine (Chlornaphazine)	494031	February 27, 1987
Bischloroethyl nitrosourea (BCNU) (Carmustine)	154938	July 1, 1987
Bis(chloromethyl)ether	542881	February 27, 1987
Bitumens, extracts of steam-refined and air refined	---	January 1, 1990
Bracken fern	---	January 1, 1990
Bromodichloromethane	75274	January 1, 1990
1,3-Butadiene	106990	April 1, 1988
1,4-Butanediol dimethanesulfonate (Busulfan)	55981	February 27, 1987
Butylated hydroxyanisole	25013165	January 1, 1990
beta-Butyrolactone	3068880	July 1, 1987
Cadmium and cadmium compounds	---	October 1, 1987
Captafol	2425061	October 1, 1988
Captan	133062	January 1, 1990
Carbon tetrachloride	56235	October 1, 1987
Carbon black extracts	---	January 1, 1990
Ceramic fibers (airborne particles of respirable size)	---	July 1, 1990
Certain combined chemotherapy for lymphomas	---	February 27, 1987
Chlorambucil	305033	February 27, 1987
Chloramphenicol	56757	October 1, 1989
Chlordane	57749	July 1, 1988
Chlordecone (Kepone)	143500	January 1, 1988
Chlordimeform	6164983	January 1, 1989
Chlorendic acid	115286	July 1, 1989
Chlorinated paraffins (Average chain length, C12; approximately 60 percent chlorine by weight)	108171262	July 1, 1989
Chlorodibromomethane	124481	January 1, 1990
Chloroethane	75003	July 1, 1990
1-(2-Chloroethyl)-3-cyclohexyl-1-nitrosourea (CCNU) (Lomustine)	13010474	January 1, 1988
1-(2-Chloroethyl)-3-(4-methylcyclohexyl)-1-nitrosourea (Methyl-CCNU)	13909096	October 1, 1988
Chloroform	67663	October 1, 1987
Chloromethyl methyl ether (technical grade)	107302	February 27, 1987
3-Chloro-2-methylpropene	563473	July 1, 1989
4-Chloro-ortho-phenylenediamine	95830	January 1, 1988
p-Chloro-o-toluidine	95692	January 1, 1990
Chlorothalonil	1897456	January 1, 1989

m (hexavalent compounds)	...	February 27, 1987
e	218019	January 1, 1990
asic Red 9 monohydrochloride	569619	July 1, 1989
l anthranilate	87296	July 1, 1989
in	15663271	October 1, 1988
Red No. 2	6358538	October 1, 1989
en emissions	...	February 27, 1987
ted estrogens	...	February 27, 1987
es	...	October 1, 1988
asidine	120718	January 1, 1988
on	135206	January 1, 1988
	14901087	January 1, 1988
osphamide (anhydrous)	50180	February 27, 1987
osphamide (hydrated)	6055192	February 27, 1987
nge No. 17	3468631	July 1, 1990
No. 8	2092560	October 1, 1990
No. 9	5160021	July 1, 1990
No. 19	81889	July 1, 1990
zine	4342034	January 1, 1988
ide	1596845	January 1, 1990
cin	20830813	January 1, 1988
chlorodiphenyldichloroethane)	72548	January 1, 1989
chlorodiphenyldichloroethylene)	72559	January 1, 1989
chlorodiphenyltrichloroethane)	50293	October 1, 1987
ichlorvos)	62737	January 1, 1989
acetylbenzidine	613354	October 1, 1989
minoanisole	615054	October 1, 1990
minoanisole sulfate	39156417	January 1, 1988
minodiphenyl ether (4,4'-Oxydianiline)	101804	January 1, 1988
minotoluene	95807	January 1, 1988
toluene (mixed)	...	January 1, 1990
a,h]acridine	226368	January 1, 1988
a,j]acridine	224420	January 1, 1988
a,h]anthracene	53703	January 1, 1988
nzo[c,g]carbazole	194592	January 1, 1988
[a,e]pyrene	192654	January 1, 1988
[a,h]pyrene	189640	January 1, 1988
[a,i]pyrene	189559	January 1, 1988
[a,l]pyrene	191300	January 1, 1988
romo-3-chloropropane (DBCP)	96128	July 1, 1987
robenzene	106467	January 1, 1989
chlorobenzidine	91941	October 1, 1987
hloro-2-butene	764410	January 1, 1990
chloro-4,4'-diaminodiphenyl ether	28434868	January 1, 1988
hloroethane	75343	January 1, 1990
oethane (Methylene chloride)	75092	April 1, 1988
hloropropane	78875	January 1, 1990
hloropropene	542756	January 1, 1989
n	60571	July 1, 1988
rol	84173	January 1, 1990

Diepoxybutane	1464535	January 1, 1988
Diesel engine exhaust	...	October 1, 1990
DI(2-ethylhexyl)phthalate	117817	January 1, 1988
1,2-Diethylhydrazine	1615801	January 1, 1988
Diethyl sulfate	64675	January 1, 1988
Diethylstilbestrol	56531	February 27, 1987
Diglycidyl resorcinol ether (DGRE)	101906	July 1, 1989
Dihydrosafrole	94586	January 1, 1988
3,3'-Dimethoxybenzidine (ortho-Dianisidine)	119904	January 1, 1988
3,3'-Dimethoxybenzidine dihydrochloride (ortho-Dianisidine dihydrochloride)	20325400	October 1, 1990
Dimethyl sulfate	77781	January 1, 1988
4-Dimethylaminoazobenzene	60117	January 1, 1988
trans-2-[(Dimethylamino)methylimino]-5-[2-(5-nitro-2-furyl)vinyl]-1,3,4-oxadiazole	55738540	January 1, 1988
7,12-Dimethylbenz(a)anthracene	57976	January 1, 1990
3,3'-Dimethylbenzidine (ortho-Tolidine)	119937	January 1, 1988
Dimethylcarbamoyl chloride	79447	January 1, 1988
1,1-Dimethylhydrazine	57147	October 1, 1989
1,2-Dimethylhydrazine	540738	January 1, 1988
Dimethylvinylchloride	513371	July 1, 1989
1,6-Dinitropyrene	42397648	October 1, 1990
1,8-Dinitropyrene	42397659	October 1, 1990
2,4-Dinitrotoluene	121142	July 1, 1988
1,4-Dioxane	123911	January 1, 1988
Diphenylhydantoin (Phenytoin)	57410	January 1, 1988
Diphenylhydantoin (Phenytoin), sodium salt	630933	January 1, 1988
Direct Black 38 (technical grade)	1937377	January 1, 1988
Direct Blue 6 (technical grade)	2602462	January 1, 1988
Direct Brown 95 (technical grade)	16071866	October 1, 1988
Disperse Blue 1	2475458	October 1, 1990
Epichlorohydrin	106898	October 1, 1987
Erionite	12510428	October 1, 1988
Estradiol 17β	50282	January 1, 1988
Estrone	53167	January 1, 1988
Ethinylestradiol	57636	January 1, 1988
Ethyl acrylate	140885	July 1, 1989
Ethyl methanesulfonate	62500	January 1, 1988
Ethyl-4,4'-dichlorobenzilate	510156	January 1, 1990
Ethylene dibromide	106934	July 1, 1987
Ethylene dichloride (1,2-Dichloroethane)	107062	October 1, 1987
Ethylene oxide	75218	July 1, 1987
Ethylene thiourea	96457	January 1, 1988
Ethyleneimine	151564	January 1, 1988
Folpet	133073	January 1, 1989
Formaldehyde (gas)	50000	January 1, 1988
2-(2-Formylhydrazino)-4-(5-nitro-2-furyl)thiazole	3570750	January 1, 1988
Furazolidone	67458	January 1, 1990
Furmecyclox	60568050	January 1, 1990

Gasoline engine exhaust (condensates/extracts)	...	October 1, 1990
Glasswool fibers (airborne particles of respirable size)	...	July 1, 1990
Glu-P-1 (2-Amino-6-methyldipyrido[1,2-a:3',2'-d]imidazole)	67730114	January 1, 1990
Glu-P-2 (2-Aminodipyrido[1,2-a:3',2'-d]imidazole)	67730103	January 1, 1990
Glycidaldehyde	765344	January 1, 1988
Glycidol	556525	July 1, 1990
Griseofulvin	126078	January 1, 1990
Gyromitrin (Acetaldehyde methylformylhydrazone)	16568028	January 1, 1988
HC Blue 1	2784943	July 1, 1989
Heptachlor	76448	July 1, 1988
Heptachlor epoxide	1024573	July 1, 1988
Hexachlorobenzene	118741	October 1, 1987
Hexachlorocyclohexane (technical grade)	...	October 1, 1987
Hexachlorodibenzodioxin	34465468	April 1, 1988
Hexachloroethane	67721	July 1, 1990
Hexamethylphosphoramide	680319	January 1, 1988
Hydrazine	302012	January 1, 1988
Hydrazine sulfate	10034932	January 1, 1988
Hydrazobenzene (1,2-Diphenylhydrazine)	122667	January 1, 1988
Indeno [1,2,3-cd]pyrene	193395	January 1, 1988
IQ (2-Amino-3-methylimidazo[4,5-f]quinoline)	76180966	April 1, 1990
Iron dextran complex	9004664	January 1, 1988
Isosafrole	120581	October 1, 1989
Lactofen	77501634	January 1, 1989
Lasiocarpine	303344	April 1, 1988
Lead acetate	301042	January 1, 1988
Lead phosphate	7446277	April 1, 1988
Lead subacetate	1335326	October 1, 1989
Lindane and other hexachlorocyclohexane isomers	...	October 1, 1989
Mancozeb	8018017	January 1, 1990
Maneb	12427382	January 1, 1990
Me-A-alpha-C (2-Amino-3-methyl-9H-pyrido[2,3-b]indole)	68006837	January 1, 1990
Medroxyprogesterone acetate	71589	January 1, 1990
Melphalan	148823	February 27, 1987
Merphalan	531760	April 1, 1988
Mestranol	72333	April 1, 1988
8-Methoxypsoralen with ultraviolet A therapy	298817	February 27, 1987
5-Methoxypsoralen with ultraviolet A therapy	484208	October 1, 1988
2-Methylaziridine (Propyleneimine)	75558	January 1, 1988
Methylazoxymethanol	590965	April 1, 1988
Methylazoxymethanol acetate	592621	April 1, 1988
3-Methylcholanthrene	56495	January 1, 1990
5-Methylchrysene	3697243	April 1, 1988
4,4'-Methylene bis(2-chloroaniline)	101144	July 1, 1987
4,4'-Methylene bis(N,N-dimethyl)benzenamine	101611	October 1, 1989
4,4'-Methylene bis(2-methylaniline)	838880	April 1, 1988
4,4'-Methylenedianiline	101779	January 1, 1988
4,4'-Methylenedianiline dihydrochloride	13552448	January 1, 1988

Methyl iodide	74884	April 1, 1988
Methyl methanesulfonate	66273	April 1, 1988
2-Methyl-1-nitroanthraquinone (of uncertain purity)	129157	April 1, 1988
N-Methyl-N'-nitro-N-nitrosoguanidine	70257	April 1, 1988
N-Methylolacrylamide	924425	July 1, 1990
Methylthiouracil	56042	October 1, 1989
Metiram	9006422	January 1, 1990
Metronidazole	443481	January 1, 1988
Michler's ketone	90948	January 1, 1988
Mirex	2385855	January 1, 1988
Mitomycin C	50077	April 1, 1988
Monocrotaline	315220	April 1, 1988
5-(Morpholinomethyl)-3-[(5-nitro-furfurylidene)-amino]-2-oxalolidinone	139913	April 1, 1988
Mustard Gas	505602	February 27, 1987
Nafenopin	3771195	April 1, 1988
1-Naphthylamine	134327	October 1, 1989
2-Naphthylamine	91598	February 27, 1987
Nickel and certain nickel compounds	...	October 1, 1989
Nickel carbonyl	13463393	October 1, 1987
Nickel refinery dust from the pyrometallurgical process	...	October 1, 1987
Nickel subsulfide	12035722	October 1, 1987
Niridazole	61574	April 1, 1988
Nitrilotriacetic acid	139139	January 1, 1988
Nitrilotriacetic acid, trisodium salt monohydrate	18662538	April 1, 1989
5-Nitroacenaphthene	602879	April 1, 1988
5-Nitro-o-anisidine	99592	October 1, 1989
4-Nitrobiphenyl	92933	April 1, 1988
6-Nitrochrysene	7496028	October 1, 1990
Nitrofen (technical grade)	1836755	January 1, 1988
2-Nitrofluorene	607578	October 1, 1990
Nitrofurazone	59870	January 1, 1990
1-[(5-Nitrofurfurylidene)-amino]-2-imidazolidinone	555840	April 1, 1988
N-[4-(5-Nitro-2-furyl)-2-thiazolyl]acetamide	531828	April 1, 1988
Nitrogen mustard (Mechlorethamine)	51752	January 1, 1988
Nitrogen mustard hydrochloride (Mechlorethamine hydrochloride)	55867	April 1, 1988
Nitrogen mustard N-oxide	126852	April 1, 1988
Nitrogen mustard N-oxide hydrochloride	302705	April 1, 1988
2-Nitropropane	79469	January 1, 1988
1-Nitropyrene	5522430	October 1, 1990
4-Nitropyrene	57835924	October 1, 1990
N-Nitrosodi-n-butylamine	924163	October 1, 1987
N-Nitrosodiethanolamine	1116547	January 1, 1988
N-Nitrosodiethylamine	55185	October 1, 1987
N-Nitrosodimethylamine	62759	October 1, 1987
p-Nitrosodiphenylamine	156105	January 1, 1988
N-Nitrosodiphenylamine	86306	April 1, 1988
N-Nitrosodi-n-propylamine	621647	January 1, 1988
N-Nitroso-N-ethylurea	759739	October 1, 1987
3-(N-Nitrosomethylamine)propionitrile	60153493	April 1, 1990
4-(N-Nitrosomethylamine)-1-(3-pyridyl)1-butanone	64091914	April 1, 1990
N-Nitrosomethylethylamine	10595956	October 1, 1989
N-Nitroso-N-methylurea	684935	October 1, 1987

troso-N-methylurethane	615532	April 1, 1988
trosomethylvinylamine	4549400	January 1, 1988
trosomorpholine	59892	January 1, 1988
trosonornicotine	16543558	January 1, 1988
trosopiperidine	100754	January 1, 1988
trosopyrrolidine	930552	October 1, 1987
trososarcosine	13256229	January 1, 1988
ithisterone (Norethindrone)	68224	October 1, 1989
:atoxin A	303479	July 1, 1990
Orange SS	2646175	April 1, 1988
, contraceptives, combined	---	October 1, 1989
, contraceptives, sequential	---	October 1, 1989
ıetholone	434071	January 1, 1988
furan S	---	January 1, 1988
:achlorophenol	87865	January 1, 1990
ıacetin	62442	October 1, 1989
ıazopyridine	94780	January 1, 1988
ıazopyridine hydrochloride	136403	January 1, 1988
ıesterin	3546109	July 1, 1989
ıobarbital	50066	January 1, 1990
ıoxybenzamine	59961	April 1, 1988
ıoxybenzamine hydrochloride	63923	April 1, 1988
ıyl glycidyl ether	1675543	October 1, 1990
henylphenate, sodium	132274	January 1, 1990
ybrominated biphenyls	---	January 1, 1988
ychlorinated biphenyls	---	October 1, 1989
ychlorinated biphenyls (containing 60 or more percent chlorine by molecular weight)	---	January 1, 1988
ygenan	53973981	January 1, 1988
ceau MX	3761533	April 1, 1988
ceau 3R	3564098	April 1, 1988
assium bromate	7758012	January 1, 1990
carbazine	671169	January 1, 1988
carbazine hydrochloride	366701	January 1, 1988
gesterone	57830	January 1, 1988
-Propane sultone	1120714	January 1, 1988
a-Propiolactone	57578	January 1, 1988
pylene oxide	75569	October 1, 1988
pylthiouracil	51525	January 1, 1988
ionuclides	---	July 1, 1989
erpine	50555	October 1, 1989
idual (heavy) fuel oils	---	October 1, 1990
charin	81072	October 1, 1989
charin, sodium	128449	January 1, 1988
role	94597	January 1, 1988
enium sulfide	7446346	October 1, 1989
le-oils	68308349	April 1, 1990
ica, crystalline (airborne particles of respirable size)	---	October 1, 1988

Soots, tars, and certain mineral oils (mineral oils may vary in composition, particularly in relation to their content of carcinogenic polycyclic aromatic hydrocarbons)	---	February 27, 1987
Sterigmatocystin	10048132	April 1, 1988
Streptozococin	18883664	January 1, 1988
Styrene oxide	96093	October 1, 1988
Sulfallate	95067	January 1, 1988
Talc containing asbestiform fibers	---	April 1, 1990
Testosterone and its esters	58220	April 1, 1988
2,3,7,8-Tetrachlorodibenzo-para-dioxin (TCDD)	1746016	January 1, 1988
1,1,2,2-Tetrachloroethane	79345	July 1, 1990
Tetrachloroethylene (Perchloroethylene)	127184	April 1, 1988
p-a,a,a-Tetrachlorotoluene	5216251	January 1, 1990
Tetranitromethane	509148	July 1, 1990
Thioacetamide	62555	January 1, 1988
4,4'-Thiodianiline	139651	April 1, 1988
Thiourea	62566	January 1, 1988
Thorium dioxide	1314201	February 27, 1987
Tobacco, oral use of smokeless products	---	April 1, 1988
Tobacco smoke	---	April 1, 1988
Toluene diisocyanate	26471625	October 1, 1989
ortho-Toluidine	95534	January 1, 1988
ortho-Toluidine hydrochloride	636215	January 1, 1988
para-Toluidine	106490	January 1, 1990
Toxaphene (Polychlorinated camphenes)	8001352	January 1, 1988
Treosulfan	299752	February 27, 1987
2,4,6-Trichlorophenol	88062	January 1, 1988
Trichloroethylene	79016	April 1, 1988
Tris(aziridinyl)-para-benzoquinone (Triaziquone)	68768	October 1, 1989
Tris(1-aziridinyl)phosphine sulfide (Thiotepa)	52244	January 1, 1988
Tris(2,3-dibromopropyl)phosphate	126727	January 1, 1988
Trp-P-1 (Tryptophan-P-1)	62450060	April 1, 1988
Trp-P-2 (Tryptophan-P-2)	62450071	April 1, 1988
Trypan blue (commercial grade)	72571	October 1, 1989
Unleaded gasoline (wholly vaporized)	---	April 1, 1988
Uracil mustard	66751	April 1, 1988
Urethane (Ethyl carbamate)	51796	January 1, 1988
Vinyl bromide	593602	October 1, 1988
Vinyl chloride	75014	February 27, 1987
4-Vinyl-1-cyclohexene diepoxide (Vinyl cyclohexene dioxide)	106876	July 1, 1990
Vinyl trichloride (1,1,2-Trichloroethane)	79005	October 1, 1990
2,6-Xylidene	87627	January 1, 1991
Zineb	12122677	January 1, 1990

SAMPLE TAKEN IN OPEN FIELD

26 A 2899 B C 20

HEAVY BROKEN LINE INDICATES FENCE INSTALLED BY CONTRACTOR MAY 12 1978.

BANCROFT AVE.

HEAVY FENCE I COUNTY

96th AVE.

45*

A-142 B-144 C-37

03

27

04

3-8"-5.8*

SANDBOX

4-8"-8.6*

C-1"-134 D-6"-10

2-8"-86.6*

1-8"-13.7*

5-8"-66.2*

A-1"-65 B-6"-22

6-8"-23.6*

S3

NOTE: CONTOUR LINES INDICATE MOUNDING

IV B-15*

G-1"-219 H-6"-10700

I A-19*

216*

7-1"-56 B-6"-1670

232

100

HATCHING INDICATES E AREA TO BE EXCAVATE TO BE REPLACED W/

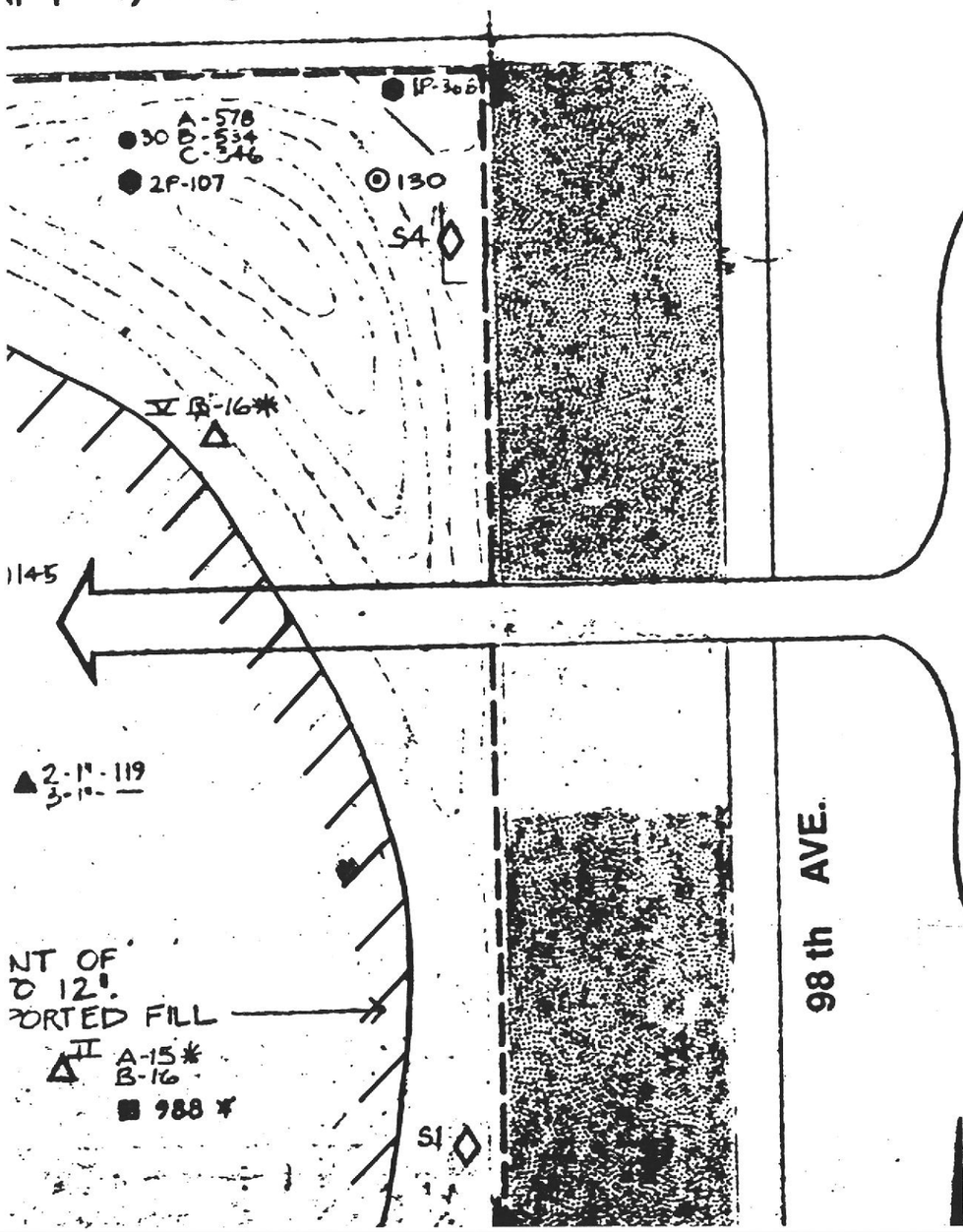
J-6"-87

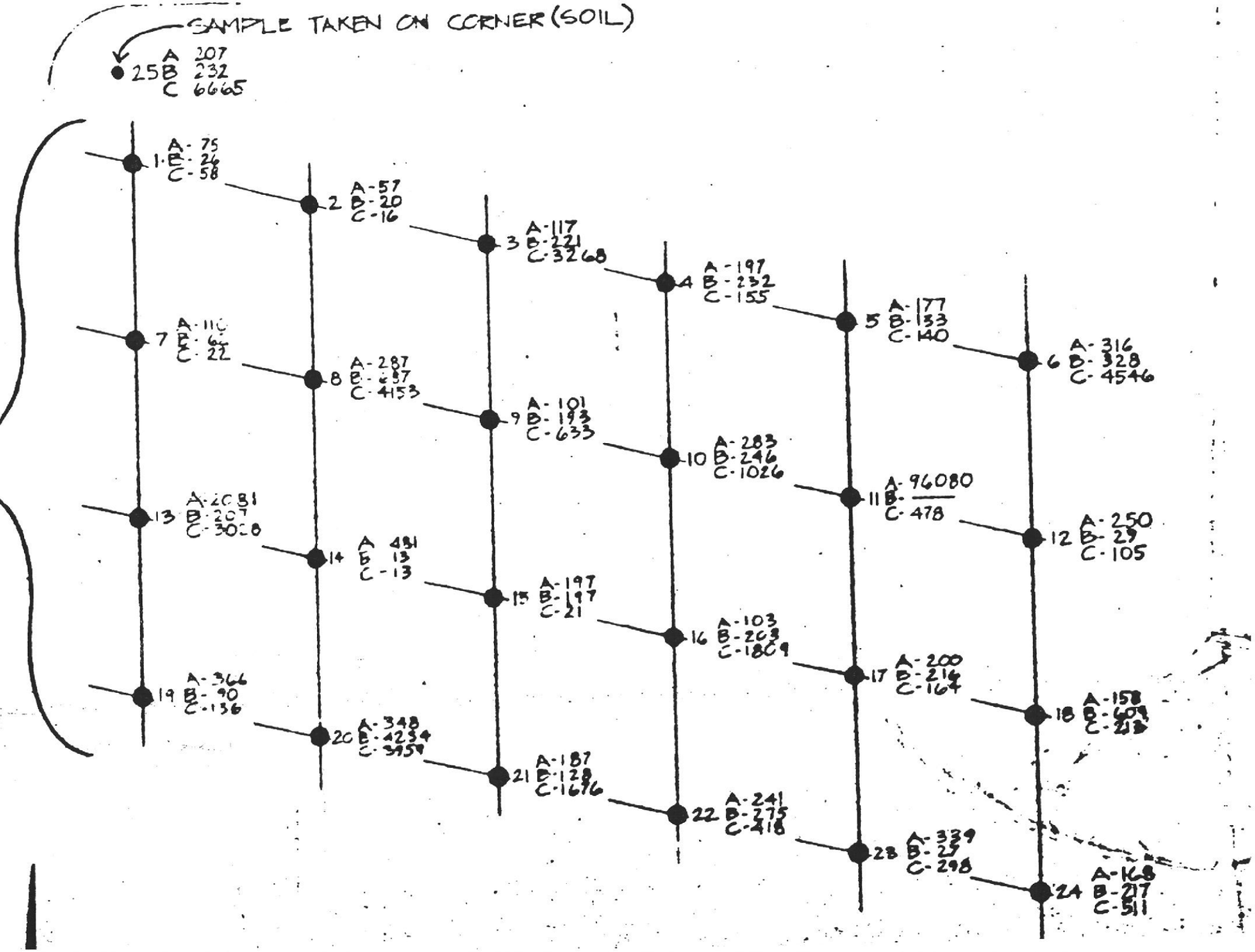
S2

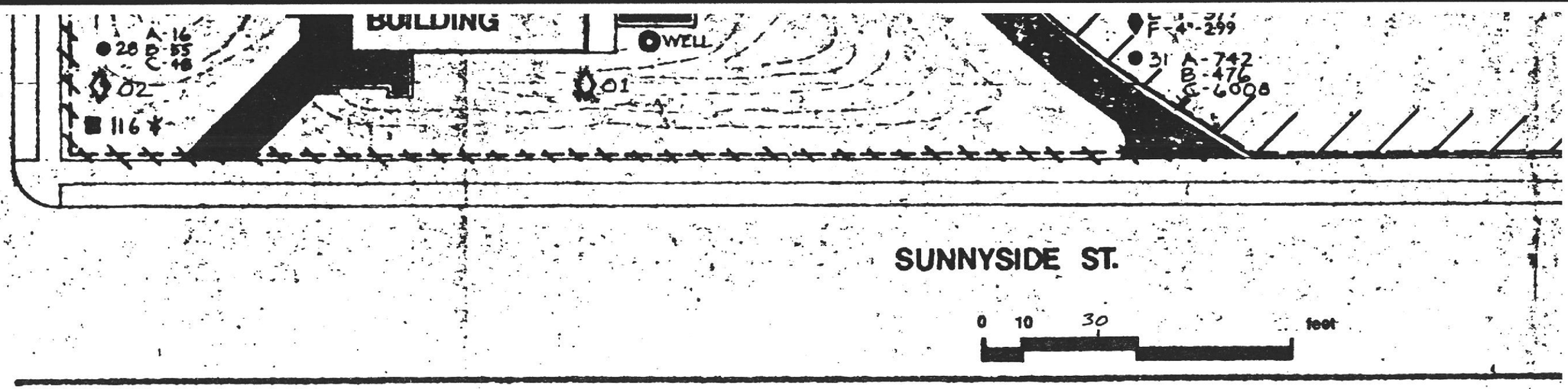
10*

III

KEN LINE INDICATES
LLED AT REQUEST OF
Y 1-4, 1978.







KEY TO LABELS

SYMBOL INDICATES SURVEY OF WHICH SAMPLE IS A PART

LAST NUMBER INDICATES PARTS PER MILLION LEAD

BLANK INDICATES TEST INCONCLUSIVE

ASTERISK INDICATES LOCATION APPROXIMATE

▲ 13 - 6" - 312 *

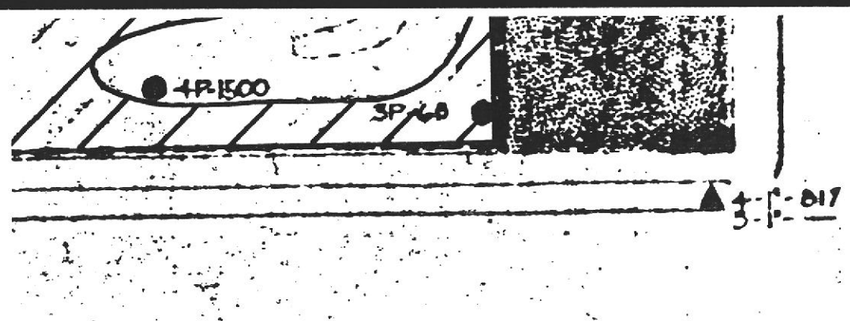
● 8 - B - 1003

SAMPLE NUMBER WITHIN SURVEY

DIMENSION OR LETTER INDICATES DEPTH AT WHICH SAMPLE WAS TAKEN.
A = 0"-1"
B = 5"-6"
C = 11"-12"

SYMBOL	AGENCY
■	COMMUNITY
⊙	CITY OF OAKLAND
●	ALAMEDA COUNTY
▲	STATE OF CALIFORNIA
♦	STATE OF CALIFORNIA
●	STATE OF CALIFORNIA
◊	CITY OF OAKLAND
□	CITY OF OAKLAND
△	STATE OF CALIFORNIA

NOTES. MAP RECONSTRUCTED FROM CITY OF OAKLAND, OFFICE OF PUBLIC WORKS ARCHITECTURAL SERVICES DEPARTMENT MAP DATED 5-18-1978. LOCATIONS OF SAMPLES COLLECTED BY THE UNIVERSITY OF CALIFORNIA ON MAY 11, 1978, AIR AND INDUSTRIAL HYGENE LABORATORY ON MAY 17,1978, AND BY THE CITY ON MAY 31,1978 NOT SHOWN AS LOCATIONS WERE NOT DOCUMENTED. SAMPLES COLLECTED BY STATE DEPARTMENT OF HEALTH SERVICES ON JUNE 23, 1978 ARE OF EMPLACED CLEAN FILL.



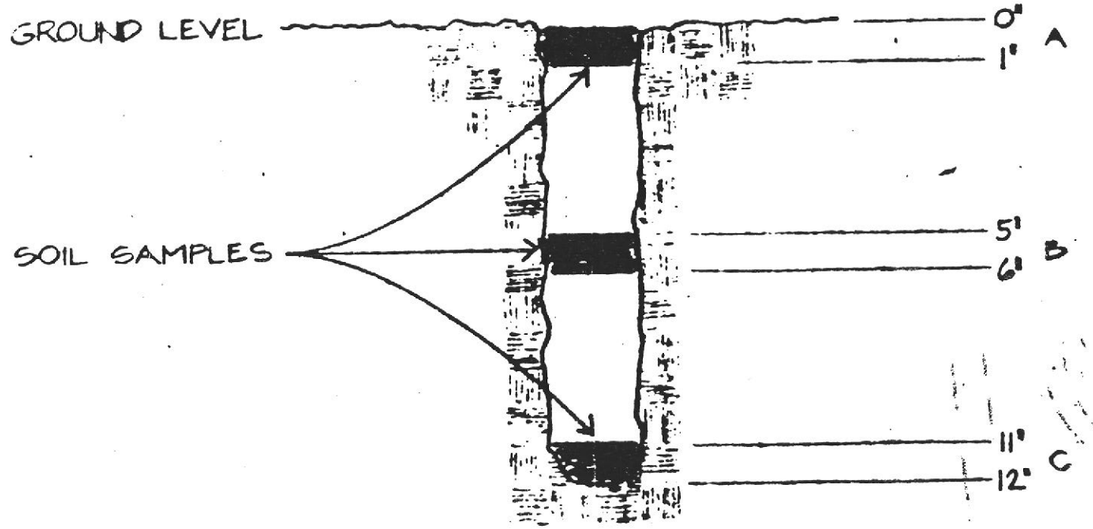
N (City of Oakland Plant North)

	DATE
	FEB. 28, 1978
	APR. 7, 1978
	AUG. 16, 1977
	JAN. 26, 1978
	MAR. 13, 1978
	APR. 4, 1978
	MAY 17. 1976
	MAR. 30. 1990
	JUNE 23 1978

CONFIDENTIAL. PRIVILEGED ATTORNEY CLIENT COMMUNICATION AND ATTORNEY WORK PRODUCT. RESTRICT DISTRIBUTION.

CORE SAMPLE DIAGRAM

NO SCALE



Project No. 93C0243A	Carter Park Oakland, CA	Sample Location Plan for Previous Investigations	Plate 1

Woodward-Clyde Consultants

CHEMICALS KNOWN TO THE STATE TO CAUSE REPRODUCTIVE TOXICITY

Developmental toxicity

Acetohydroxamic acid	546883	April 1, 1990
All-trans retinoic acid	302794	January 1, 1989
Alprazolam	28981977	July 1, 1990
Amikacin sulfate	39831555	July 1, 1990
Aminoglutethimide	125848	July 1, 1990
Aminopterin	54626	July 1, 1987
Aspirin (NOTE: It is especially important not to use aspirin during the last three months of pregnancy, unless specifically directed to do so by a physician because it may cause problems in the unborn child or complications during delivery.)	50782	July 1, 1990
Benzphetamine hydrochloride	5411223	April 1, 1990
Bischloroethyl nitrosourea (BCNU) (Carmustine)	154938	July 1, 1990
Bromoxynil	1689845	October 1, 1990
1,4-Butanediol dimethylsulfonate (Busulfan)	55981	January 1, 1989
Carbon disulfide	75150	July 1, 1989
Carbon monoxide	630080	July 1, 1989
Carboplatin	41575944	July 1, 1990
Chenodiol	474259	April 1, 1990
Chlorcyclizine hydrochloride	1620219	July 1, 1987
Chlorambucil	305033	January 1, 1989
Chlordecone (Kepone)	143500	January 1, 1989
1-(2-Chloroethyl)-3-cyclohexyl-1-nitrosourea (CCNU) (Lomustine)	13010474	July 1, 1990
Clomiphene citrate	50419	April 1, 1990
Cocaine	50362	July 1, 1989
Conjugated estrogens	...	April 1, 1990
Cyanazine	21725462	April 1, 1990
Cycloheximide	66819	January 1, 1989
Cyclophosphamide (anhydrous)	50180	January 1, 1989
Cyclophosphamide (hydrated)	6055192	January 1, 1989
Cyhexatin	13121705	January 1, 1989
Cytarabine	147944	January 1, 1989
Danazol	17230885	April 1, 1990
Daunorubicin hydrochloride	23541506	July 1, 1990
Diethylstilbestrol (DES)	56531	July 1, 1987
Dinocap	39300453	April 1, 1990
Dinoseb	88857	January 1, 1989
Diphenylhydantoin (Phenytoin)	57410	July 1, 1987
Doxycycline	564250	July 1, 1990
Ergotamine tartrate	379793	April 1, 1990
Ethyl alcohol in alcoholic beverages	...	October 1, 1987
Ethylene glycol monoethyl ether	110805	January 1, 1989
Ethylene glycol monomethyl ether	109864	January 1, 1989
Etoposide	33419420	July 1, 1990
Etretinate	54350480	July 1, 1987

Fluorouracil	51218	January 1, 1989
Fluoxymesterone	76437	April 1, 1990
Flutamide	13311847	July 1, 1990
Halazepam	23092173	July 1, 1990
Hexachlorobenzene	118741	January 1, 1989
Ifosfamide	3778732	July 1, 1990
Iodine-131	24267569	January 1, 1989
Isotretinoin	4759482	July 1, 1987
Lead	...	February 27, 1987
Lithium carbonate	554132	January 1, 1991
Lithium citrate	919164	January 1, 1991
Lorazepam	846491	July 1, 1990
Medroxyprogesterone acetate	71589	April 1, 1990
Megestrol acetate	595335	January 1, 1991
Melphalan	148823	July 1, 1990
Menotropins	9002680	April 1, 1990
Mercaptopurine	6112761	July 1, 1990
Mercury and mercury compounds	...	July 1, 1990
Methacycline hydrochloride	3963959	January 1, 1991
Methimazole	60560	July 1, 1990
Methotrexate	59052	January 1, 1989
Methotrexate sodium	15475566	April 1, 1990
Methyl mercury	...	July 1, 1987
Methyltestosterone	58184	April 1, 1990
Midazolam hydrochloride	59467968	July 1, 1990
Misoprostol	62015398	April 1, 1990
Mitroxantrone hydrochloride	70476823	July 1, 1990
Nafarelin acetate	86220420	April 1, 1990
Netilmicin sulfate	56391572	July 1, 1990
Nicotine	54115	April 1, 1990
Nitrogen mustard (Mechlorethamine)	51752	January 1, 1989
Nitrogen mustard hydrochloride (Mechlorethamine hydrochloride)	55867	July 1, 1990
Norethisterone (Norethindrone)	68224	April 1, 1990
Norethisterone (Norethindrone)/Ethinyl estradiol	68224/57636	April 1, 1990
Norethisterone (Norethindrone)/Mestranol	68224/72333	April 1, 1990
Norgestrel	6533002	April 1, 1990
Oxytetracycline	79572	January 1, 1991
Paramethadione	115673	July 1, 1990
Penicillamine	52675	January 1, 1991
Pentobarbital sodium	57330	July 1, 1990
Phenacemide	63989	July 1, 1990
Pipobroman	54911	July 1, 1990

cin	18378897	April 1, 1990
orinated biphenyls	...	January 1, 1991
azine hydrochloride	366701	July 1, 1990
hiouracil	51525	July 1, 1990
/retinyl esters, when in daily dosages in as of 10,000 IU, or 3,000 retinol equivalents. E: Retinol/retinyl esters are required and ntial for maintenance of normal reproductive tion. The recommended daily level during nancy is 8,000 IU.)	...	July 1, 1989
in	36791045	April 1, 1990
mycin sulfate	3810740	January 1, 1991
len citrate	54965241	July 1, 1990
am	846504	April 1, 1990
erone enanthate	315377	April 1, 1990
cline hydrochloride	64755	January 1, 1991
mide	50351	July 1, 1987
nine	154427	July 1, 1990
smoke (primary)	...	April 1, 1988
cin sulfate	49842071	July 1, 1990
	108883	January 1, 1991
lam	28911015	April 1, 1990
tane	13647353	April 1, 1990
hadione	127480	January 1, 1991
litropin	26995915	April 1, 1990
ate	99661	July 1, 1987
stine sulfate	143679	July 1, 1990
stine sulfate	2068782	July 1, 1990
in	81812	July 1, 1987

reproductive toxicity

terin	54626	July 1, 1987
ic steroids	...	April 1, 1990
n (NOTE: It is especially important not to use irin during the last three months of pregnancy, ess specifically directed to do so by a sician because it may cause problems in the orn child or complications during delivery.)	50782	July 1, 1990
disulfide	75150	July 1, 1989
e	50362	July 1, 1989
hosphamide (anhydrous)	50180	January 1, 1989
hosphamide (hydrated)	6055192	January 1, 1989

Ethylene oxide	75218	February 27, 1987
Lead	...	February 27, 1987
Tobacco smoke (primary)	...	April 1, 1988

Male reproductive toxicity

Anabolic steroids	...	April 1, 1990
Carbon disulfide	75150	July 1, 1989
Cyclophosphamide (anhydrous)	50180	January 1, 1989
Cyclophosphamide (hydrated)	6055192	January 1, 1989
1,2-Dibromo-3-chloropropane (DBCP)	96128	February 27, 1987
Dinitrobenzene	25154545	July 1, 1990
Dinoseb	88857	January 1, 1989
Ethylene glycol monoethyl ether	110805	January 1, 1989
Ethylene glycol monomethyl ether	109864	January 1, 1989
Lead	...	February 27, 1987
Tobacco smoke (primary)	...	April 1, 1988

Date: January 1, 1991

WARNING CONCENTRATIONS

Chemical	CAS #	PEL	Warning Concentration	VP	eV	Solubility	Density
___ Acetone	67641	750 ppm	100 ppm	266 mm	9.69	Miscible	0.80
___ Benzene	71432	1 ppm	4.68 ppm	75 mm	9.25	0.18 %	0.88
___ Chloroform	67663	2 ppm	50 ppm	160 mm	11.42	0.8 %	1.50
___ Coal Tar Naphtha	65996794	None	Variable	5 mm	N/A	Insoluble	N/A
___ Ethylbenzene	100414	100 ppm	0.25 ppm	7.1 mm	8.76	0.015 %	0.87
___ Hexane	110543	50 ppm	1400 ppm	124 mm	10.18	0.014 %	0.66
___ Hydrogen Sulfide	7783064	10 ppm	0.8 ppm	20 atm	10.43	2.9 %	N/A
___ Methylene Chloride	750092	100 ppm	25 ppm	350 mm	11.35	1.3 %	1.33
___ Methyl Ethyl Ketone	78933	200 ppm	4.8 ppm	70 mm	9.48	27 %	0.81
___ PCBs	53469219	0.5 mg/m^3	N/A	0.001 mm	N/A	Insoluble	1.44
___ Petroleum Distillates	8002059	400 ppm	Variable	40 mm	N/A	0.04 %	N/A
___ Phenol	108952	5 ppm	0.1 ppm	0.36 mm	8.5	8.4 %	1.07
___ Tetrachloroethylene	127184	25 ppm	4.68 ppm	14 mm	9.32	0.015 %	1.63
___ Toluene	108883	100 ppm	0.17 ppm	22 mm	8.82	0.05 %	0.87
___ 1,1,1, Trichloroethane	71556	350 ppm	20 ppm	100 mm	11.25	0.07 %	1.34
___ Trichloroethylene	79016	25 ppm	21.4 ppm	58 mm	9.47	0.1 %	1.47
___ Vinyl Chloride	75014	1 ppm	260 ppm	2580 mm	9.9995	Slight	0.92
___ Xylene	1330207	100 ppm	1.8 ppm	9 mm	8.56	0.00003 %	0.86

N/A = Not Available
CAS# = Chemical Abstract Services Number
PEL = OSHA Permissible Exposure Limit
VP = Vapor Pressure

Pesticide	CAS #	PEL	Warning Concentration	VP	Solubility
___ Aldrin	309002	0.25mg/m^3	N/A	0.000006 mm	Insoluble
___ Carbaryl	63252	5mg/m^3	Odorless	0.005 mm	0.004 %
___ Chlordane	57749	0.5mg/m^3	Odorless	0.00001 mm	Insoluble
___ DBCP	96128	1 ppb	N/A	0.8 mm	0.1 %
___ DDT	50293	1 mg/m^3	2.9mg/m^3	0.00000017 mm	0.00001 %
___ Dieldrin	60571	0.25mg/m^3	0.41 ppm	0.00000018 mm	10 ppb
___ Endrin	72208	0.1mg/m^3	N/A	0.0000002 mm	160 ppb
___ Ethylene DiBromide	106934	0.13 ppm	10 ppm	11 mm	0.4 %
___ Heptachlor	76448	0.5mg/m^3	0.02 ppm	0.0003 mm	Insoluble
___ Lindane	58899	0.5mg/m^3	3.9mg/m^3	0.0000094 mm	0.001 %
___ Malathion	121755	10mg/m^3	10mg/m^3	0.00004 mm	0.0145 %
___ Parathion	56382	0.1mg/m^3	0.48mg/m^3	0.0004 mm	0.00002 %

CAS# = Chemical Abstract Services Number
PEL = OSHA Permissible Exposure Limit
VP = Vapor Pressure

HEALTH EFFECTS

Chemical	Health Effects	Target Organs	Chemical	Health Effects	Target Organs
Acetone	4,6,8,11,16,21	J,K	Aldrin	Ca,2,3,7,11,15	D,G,J,K
Benzene	Ca,1,4,8,11,15,17,18	C,D,E,J,K	Carbaryl	1,3,5,13,15,22	D,J,K
Chloroform	Ca,7,8,11,15	E,G,J,K	Chlordane	1,3,5,15,22	D,E,G,H,J,K
Coal Tar Naphtha	4,8,16	E,J,K	DBCP	Ca,8,15,16,21,22	D,G,J,K
Ethylbenzene	2,4,8,11	D,E,J,K	DDT	Ca,3,7,8,22	D,G,J,K
Hexane	4,8,10,11,12,16	E,H,J,K	Dieldrin	Ca,2,3,7,11,15,22	D,G,J,K
Hydrogen Sulfide	2,3,7,8,9,11,17	E,J	Endrin	1,3,7,15,22	D,G
Methylene Chloride	8,9,12,14,21	D,E,J	Ethylene DiBromide	Ca,4,8,17	E,G,J,J,K
Methyl Ethyl Ketone	7,8,11,16,22	D,H	Heptachlor	3	D,G
PCBs	Ca,4,8	E,G,K	Lindane	3,4,8,16	B,D,E,G,J,K
Petroleum Distillates	7,8,11,16,21	D,E,J,K	Malathion	1,5,8,13,15,22	B,D,G,J
Phenol	3,4,8,16,21	G,J,K	Parathion	1,3,4,5,11,13,15,19	B,D,E,J,K
Tetrachloroethylene	Ca,7,8,11,16,20	D,E,G,J,J			
Toluene	4,6,11	D,G,J,K			
1,1,1-Trichloroethane	4,8,11	D,E,K			
Trichloroethylene	Ca,4,8,11,15,22	D,G,J,J,K			
Vinyl Chloride	Ca,1	B,D,G,J			
Xylene	1,5,8,15,18,21	B,D,E,G,J,K			

Metal	CAS #	PEL	Health Effects	Target Organs
Arsenic, inorganic	7440382	0.01 mg/m^3	Ca, 4, 17, 20	G, H, I, K
Asbestos	1332214	0.2 fibers/cc	Ca, 17	H
Chromium VI	7440473	0.05 mg/m^3	Ca, 17	J
Copper	7440508	1.0 mg/m^3	4,8,16,21	G,J,J,K
Cyanide	151508	5.0 mg/m^3	4,8,11,15,17,23	D,E,J,K
Lead	7439921	0.05 mg/m^3	1	B,D,J
Mercury	7439976	0.05 mg/m^3	4,8,9,11	D,E,J,J,F
Phosphorous	7723140	0.1 mg/m^3	1,8,17	B,E,G,J,J,K
Polynuclear Aromatics (coal tar pitch volatiles)	8007452	0.2 mg/m^3	Ca, 4	A,J,J,K
Silica (crystalline)	14808607	0.05 mg/m^3	17	J

CAS# = Chemical Abstract Services Number

PEL = OSHA Permissible Exposure Limit

HEALTH EFFECTS

1. Abdominal Pain
2. Coma
3. Convulsions
4. Dermatitis
5. Diarrhea
6. Dilated Pupils
7. Dizziness
8. Eye Irritation
9. Fatigue
10. Giddiness
11. Headache
12. Light Headed
13. Miosis (Pinpoint Pupils)
14. Narcosis
15. Nausea
16. Nose Irritation
17. Respiratory Irritant
18. Staggering Gait
19. Sweating
20. Tearing
21. Throat Irritation
22. Vertigo
23. Vomiting

Ca Carcinogen

TARGET ORGANS

A. Bladder
B. Blood
C. Bone Marrow
D. Central Nervous System
E. Eyes
F. Heart
G. Liver
H. Lungs
I. Kidneys
J. Respiratory System
K. Skin

JOB SAFETY & HEALTH PROTECTION

The Occupational Safety and Health Act of 1970 provides job safety and health protection for workers by promoting safe and healthful working conditions throughout the Nation. Requirements of the Act include the following:

Employers

All employers must furnish to employees employment and a place of employment free from recognized hazards that are causing or are likely to cause death or serious harm to employees. Employers must comply with occupational safety and health standards issued under the Act.

Employees

Employees must comply with all occupational safety and health standards, rules, regulations and orders issued under the Act that apply to their own actions and conduct on the job.

The Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor has the primary responsibility for administering the Act. OSHA issues occupational safety and health standards and its Compliance Safety and Health Officers conduct jobsite inspections to help ensure compliance with the Act.

Inspection

The Act requires that a representative of the employer and a representative authorized by the employees be given an opportunity to accompany the OSHA inspector for the purpose of aiding the inspection.

Where there is no authorized employee representative, the OSHA Compliance Officer must consult with a reasonable number of employees concerning safety and health conditions in the workplace.

Complaint

Employees or their representatives have the right to file a complaint with the nearest OSHA office requesting an inspection if they believe unsafe or unhealthful conditions exist in their workspace. OSHA will withhold on request names of employees complaining.

The Act provides that employees may not be discharged or discriminated against in any way for filing safety and health complaints or for otherwise exercising their rights under the Act.

Employees who believe they have been discriminated against may file a complaint with their nearest OSHA office within 30 days of the alleged discrimination.

Citation

If upon inspection OSHA believes an employer has violated the Act, a citation alleging such violations will be issued to the employer. Each citation will specify a time period within which the alleged violation must be corrected.

The OSHA citation must be prominently displayed at or near the place of alleged violation for three days, or until it is corrected, whichever is later, to warn employees of dangers that may exist there.

Proposed Penalty

The Act provides for mandatory penalties against employers of up to $1,000 for each serious violation and for optional penalties of up to $1,000 for each nonserious violation. Penalties of up to $1,000 per day may be proposed for failure to correct violations within the proposed time period. Also, any employer who willfully or repeatedly violates the Act may be assessed penalties of up to $10,000 for each such violation.

Criminal penalties are also provided for in the Act. Any willful violation resulting in death of an employee, upon conviction, is punishable by a fine of not more than $10,000, or by imprisonment for not more than six months, or by both. Conviction of an employer after a first conviction doubles these maximum penalties.

Voluntary Activity

While providing penalties for violations, the Act also encourages efforts by labor and management, before an OSHA inspection, to reduce workplace hazards voluntarily and to develop and improve safety and health programs in all workplaces and industries. OSHA's Voluntary Protection Programs recognize outstanding efforts of this nature.

Such voluntary action should initially focus on the identification and elimination of hazards that could cause death, injury or illness to employees and supervisors. There are many public and private organizations that can provide information and assistance in this effort if requested. Also, your local OSHA office can provide considerable help and advice on solving safety and health problems or can refer you to other sources for help such as training.

Consultation

Free consultative assistance, without citation or penalty, is available to employers, on request, through OSHA supported programs in most State departments of labor or health.

More Information

Additional information and copies of the Act, specific OSHA safety and health standards and other applicable regulations may be obtained from your employer or from the nearest OSHA Regional Office in the following locations:

Atlanta, Georgia
Boston, Massachusetts
Chicago, Illinois
Dallas, Texas
Denver, Colorado
Kansas City, Missouri
New York, New York
Philadelphia, Pennsylvania
San Francisco, California
Seattle, Washington

Telephone numbers for these offices and additional area office locations are listed in the telephone directory under the United States Department of Labor in the United States Government listing.

Washington, D.C.
1985
OSHA 2203

William E. Brock, Secretary of Labor

U.S. Department of Labor
Occupational Safety and Health Administration

Under provisions of Title 29, Code of Federal Regulations, Part 1903.2(a)(1), employers must post this notice (or a facsimile) in a conspicuous place where notices to employees are customarily posted.

SAFETY AND HEALTH PROTECTION ON THE JOB

CAL OSHA

State of California
Department of Industrial Relations

The California Occupational Safety and Health Act of 1973 provides job safety and health protection for workers. The Department of Industrial Relations has primary responsibility for administering the Cal/OSHA program. Job safety and health standards are promulgated by the Occupational Safety and Health Standards Board. Employers and employees are required to comply with these standards. Enforcement is carried out by the Division of Occupational Safety and Health within the Department of Industrial Relations.

EMPLOYERS AND EMPLOYEES

California law requires every employer to provide employment and a place of employment which are safe and healthful for the employees therein. Employers and employees are required to comply with the occupational safety and health standards contained in Title 8 of the California Code of Regulations and all rules, regulations and orders pursuant to Division 5 of the California Labor Code which are applicable to their employment and actions on the job.

COMPLIANCE WITH JOB SAFETY AND HEALTH REQUIREMENTS

To ensure compliance with State job safety and health requirements, the Division of Occupational Safety and Health conducts periodic jobsite inspections. The inspections are made by trained safety engineers and industrial hygienists.

The law provides that an authorized representative of the employer and a representative of the employees be given an opportunity to accompany the safety engineer/industrial hygienist for the purpose of aiding the inspection. Where there is no authorized employee representative, the safety engineer/industrial hygienist talks with a reasonable number of employees about the safety and health conditions in the workplace.

Every employee has the right to bring unsafe or unhealthful conditions to the attention of the safety engineer/industrial hygienist making the inspection. In addition, any employee who believes unsafe or unhealthful conditions exist at the worksite has the right to notify the Division of Occupational Safety and Health. The Division upon request will withhold the names of employees who submit or make statements during an inspection or investigation.

If the Division of Occupational Safety and Health believes that an employer has violated a safety and health standard or order, it issues a citation to the employer. Each citation specifies a date by which the alleged violation must be corrected. The law provides for mandatory penalties against employers of up to $2,000 for each serious violation and for optional penalties of up to $1,000 for each general violation. Penalties of up to $2,000 per day may be proposed for failure to correct serious violations and up to $1,000 per day may be proposed for failure to correct general violations by the abatement date. Also any employer who willfully or repeatedly violates any occupational safety and health standard or order may be assessed civil penalties of not more than $20,000 for serious violations and $10,000 for general violations.

A willful violation that causes death or permanent impairment of the body of any employee results, upon conviction, in a fine of not more than $10,000 or imprisonment of not more than six months, or both. A second conviction, after a first conviction, doubles these maximum penalties.

While governmental entities may be cited on the same basis as other employers, and abatement dates set, civil penalties will not be assessed.

An employer who receives a citation, Order to Take Special Action or Special Order must post it prominently at or near the place of the violation for three working days, or until the unsafe condition is corrected, whichever is longer, to warn employees of danger that may exist there. Any employee may protest the time allowed for correction of the violation.

COMPLAINTS

Employees or their representatives who believe unsafe or unhealthful conditions exist in their workplace have the right to file a complaint with any office of the Division of Occupational Safety and Health and thereby to request an inspection. The Division keeps confidential the names of complainants unless they request otherwise.

An employee may not be fired or punished in any way for filing a complaint about unsafe or unhealthful working conditions or using any other right given to employees by the Cal/OSHA law. An employee of a private employer who believes that he/she has been fired or punished for excercising such rights may file a complaint about this discrimination with the nearest office of the Department of Industrial Relations - Division of Labor Standards Enforcement (State Labor Commissioner) or with the San Francisco office of the U.S. Department of Labor, Occupational Safety and Health Administration. Employees of state or local government agencies may file discrimination complaints only with the State Labor Commissioner. Consult your local telephone directory for the office nearest you.

OTHER EMPLOYEE RIGHTS

Any employee has the right to refuse to perform work which would violate the Cal/OSHA Act or any occupational safety or health standard or order where such violation would create a real and apparent hazard to the employee or other employees.

Employers who use any substance listed as a hazardous substance in Section 339 of Title 8 of the California Code of Regulations or subject to the Federal Hazard Communication Standard (29 CFRS 1910.1200) must provide employees with information on the contents of material safety data sheets (MSDS) or equivalent information about the substance which trains employees to use the substance safely.

Employers shall make available on a timely and reasonable basis a material safety data sheet on each hazardous substance in the workplace upon request of an employee collective bargaining representative, or an employee's physician.

Employees have the right to see and copy their medical records and accurate records of employee exposure to potentially toxic materials or harmful physical agents.

Any employee has the right to observe monitoring or measuring of employee exposure to hazards conducted pursuant to Cal/OSHA standards. Employers must tell their employees when they are being, or have been, exposed to concentrations of harmful substances higher than the exposure limits allowed by Cal/OSHA standards, and the corrective action being taken.

For information and assistance, contact the nearest office of the Division of Occupational Safety and Health. See addresses below.

The law requires each employer in California to post this poster conspicuously in each workplace.

CONSULTATION SERVICE

In order to encourage voluntary compliance, Cal/OSHA provides free, upon request, a full range of occupational safety and health consulting services. The Cal/OSHA Consultation Service is separate from Cal/OSHA enforcement activities.

OFFICES OF THE DIVISION OF OCCUPATIONAL SAFETY AND HEALTH

HEADQUARTERS: 395 Oyster Point Blvd. So. San Francisco 94080

Regional Offices

Anaheim	2100 E. Katella Ave., Room 125, 92806	(714) 939-8611
Los Angeles	3550 West Sixth Street, Suite 413, 90020	(213) 736-4911
Sacramento	2422 Arden Way, Suite B-53, 95825	(916) 920-6127
San Francisco	455 Golden Gate Ave., Room 1171, 94102	(415) 557-8640

District Offices

Anaheim	2100 E. Katella Ave., Room 140, 92806	(714) 939-0145
Bakersfield	4800 Stockdale Highway, Suite 212, 93309	(805) 395-2718
Concord	1465 Enea Circle, Bldg. E, Suite 900, 94520	(415) 676-5333
Covina	1123 So. Parkview, Suite 100, 91724	(818) 966-1166
Fresno	2550 Mariposa St., Room 4000, 93721	(209) 445-5302
Long Beach	401 E. Ocean Blvd., Room, 400, 90802	(213) 590-5035
Los Angeles	3550 West Sixth St., Room 431, 90020	(213) 736-3041
Modesto	1209 Woodrow Ave., Suite C-4, 95350	(209) 576-6260
Oakland	7700 Edgewater Dr., Suite 658, 94621	(415) 568-8602
Redding	381 Hemsted Drive, 96002	(916) 224-4743
Sacramento	2422 Arden Way, Suite B-55, 95825	(916) 920-6123
San Bernardino	303 West Third St., Room 640, 92401	(714) 383-4321
San Diego	7807 Convoy Court, Suite 140, 92111	(619) 237-7325
San Francisco	455 Golden Gate Ave., Room 1193, 94102	(415) 557-1677
San Jose	100 Paseo De San Antonio, Suite 101, 95113	(408) ~~277-1200~~ 452-7288
San Mateo	1900 So. Norfolk St., Suite 215, 94403	(415) 573-3812
Santa Fe Spgs	13050 Heritage Park Dr. Ste. 201, 90670	(213) 944-7676
Santa Rosa	50 "D" St., Suite 430, 95404	(707) 576-2388
Van Nuys	6150 Van Nuys Blvd., Suite 405, 91401	(818) 901-5403
Ventura	1655 Mesa Verde, 93003	(805) 654-4581
Vernon	13050 Heritage Pk Dr, Ste 201,Santa Fe Spgs 90670	(213) 944-7676

Field Offices

Chico	555 Rio Lindo, Suite A, 95926	(916) 895-4761
Eureka	619 Second St., Room 109, 95501	(707) 445-6611
Salinas	1164 Monroe St., Suite 1, 93906	(408) 443-3050
Stockton	31 E. Channel St., Room 418, 95202	(209) 948-7762
Ukiah	620 Kings Court, Suite 5, 95482	(707) 463-4783

CAL/OSHA CONSULTATION SERVICE

Headquarters: 395 Oyster Pt. Blvd., 3rd Fl., So.San Francisco, 94080 (415) 737-2843

Area Offices

Downey	8535 E. Florence Ave., Suite 200, 90240	(213) 861-9993
Fresno	1901 N. Gateway, Suite 102, 93727	(209) 454-1295
Sacramento	2424 Arden Way, Suite D-90, 95825	(916) 920-6131
San Diego	7827 Convoy Court, Suite 406, 92111	(619) 279-3771
San Mateo	3 Waters Park Drive, Suite 230, 94403	(415) 573-3862

Persons wishing to register a complaint alleging inadequacy in the administration of the California Occupational Safety and Health Plan may do so by contacting the San Francisco Regional Office of the Occupational Safety and Health Administration (OSHA), U.S. Department of Labor (Tel. 415/744-6670). OSHA monitors the operation of State plans to assure that continued approval is merited.

TO ALL EMPLOYERS OF CALIFORNIA EMPLOYEES: Section 6408(a) of the California Labor Code requires that information shall be posted regarding protections and obligations of employees under the occupational safety and health laws. This poster meets that requirement and must be prominently posted in all places of employment in the state of California. Section 6431 of the California Labor Code provides that any employer who violates any of the posting requirements of Section 6408 of the California Labor Code shall be assessed a civil penalty of up to one thousand dollars ($1,000) for each violation.

APRIL 1990