Appendix R.F

Health Risk Assessment and Site Characterization Report

Appendix R.F

Miller Children's Hospital
Health Risk Assessment

Please note that this is only a summary of the draft document. The draft document is being reviewed by the Department of Toxic Substance Control, and will be available at the public outreach meeting on May 5th, 2005.

DRAFT
HUMAN HEALTH RISK ASSESSMENT
LONG BEACH MEMORIAL MEDICAL CENTER
OPERABLE UNIT 1: MILLER CHILDREN'S HOSPITAL
LONG BEACH, CALIFORNIA

Prepared for:

Long Beach Memorial Medical Center
2801 Atlantic Avenue
Long Beach, California 90806-1737

Prepared by:

SCS Engineers
3900 Kilroy Airport Way, Suite 100
Long Beach, California 90806-6816
(562) 426-9544

April 2005
File No. 01203219.03, Task 10

This Human Health Risk Assessment report for the Long Beach Memorial Center, Operable Unit 1: Miller Children's Hospital located in the City of Long Beach, California, dated April 2005, was prepared and reviewed by the following:

Prepared by:

Allyson L. Baluyot

Allyson L. Baluyot
Staff Scientist

Paul Damian

Paul Damian, PhD, MPH, DABT
Risk Assessment Practice Leader
Board Certified Toxicologist

Reviewed by:

Michael L. Leonard, Sr.

Michael L. Leonard, Sr., PE
Project Manager

SCS ENGINEERS

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GLOSSARY OF ACRONYMS/ABBREVIATIONS

ABS	Dermal Absorption Factor
AEHS	Association of Environmental Health Sciences
AF	Soil-to-Skin Adherence Factor
AT	Averaging Time
bgs	Below Ground Surface
BW	Body Weight
Cal-EPA	California Environmental Protection Agency
CDC	Center for Disease Control
CDI	Chronic Daily Intake
CF	Conversion Factor
cm	Centimeter
COPCs	Chemicals of Potential Concern
CS	Chemical Concentration in Soil
CSF	Cancer Slope Factor
dl	Deciliter
DL	Detection Limit
DTSC	California Environmental Protection Agency Department of Toxic Substances Control
ED	Exposure Duration
EF	Exposure Frequency
EPC	Exposure Point Concentration
ES	Executive Summary
°F	Fahrenheit
FI	Fraction of Ingested Chemicals

FOD	Frequency of Detection
HEAST	Health Effects Assessment Summary Tables
HERD	Human and Ecological Risk Division
HI	Hazard Index
HQ	Hazard Quotient
HRA	Health Risk Assessment
IR	Ingestion Rate
InhR	Inhalation Rate
IRIS	Integrated Risk Information System
J&E	Johnson and Ettinger
kg	Kilogram
km	Kilometer
LBMMC	Long Beach Memorial Medical Center
mg	Milligram
mi	Mile
mph	Miles Per Hour
MCH	Miller Children's Hospital
MSL	Mean Sea Level
NCEA	National Center for Environmental Assessment
NOAA	National Oceanic and Atmospheric Administration
ND	Not Detected
OEHHA	Office of Environmental Health Hazard Assessment
OU	Operable Unit
PAHs	Polynuclear Aromatic Hydrocarbons
PEF	Particulate Emission Factor

PRG	Preliminary Remediation Goal
PQL	Practical Quantification Limit
QA	Quality Assurance
QC	Quality Control
RfD	Reference Dose
RME	Reasonable Maximum Exposure
RWQCB	Regional Water Quality Control Board
SA	Skin Surface Area
sec	Second
SCS	SCS Engineers
SQL	Sample Quantification Limit
SS	Shallow Soil
TPH	Total Petroleum Hydrocarbons
TRPH	Total Recoverable Petroleum Hydrocarbons
TTEMI	Tetra Tech EMI, Inc.
μg	Microgram
USEPA	U. S. Environmental Protection Agency
UCLM	Upper Confidence Limit of the Arithmetic Mean
VOC	Volatile Organic Compound

HUMAN HEALTH RISK ASSESSMENT

LONG BEACH MEMORIAL MEDICAL CENTER

OPERABLE UNIT 1: MILLER CHILDREN'S HOSPITAL

LONG BEACH, CALIFORNIA

EXECUTIVE SUMMARY

A baseline human health risk assessment (HRA) was prepared for the Long Beach Memorial Medical Center Miller Children's Hospital expansion project. The proposed construction involves the placement of buildings over a former ravine that is classified as a closed solid waste disposal site. The former ravine was historically filled using petroleum impacted soil and debris. Site contaminants have therefore consisted mostly of petroleum-product related chemicals such as benzene, toluene, ethylbenzene, xylene, polynuclear aromatic hydrocarbons (PAHs) and total petroleum hydrocarbons.

An HRA was prepared consistent with state and federal risk assessment guidance to evaluate potential health risks associated with the project site. The general approach was developed in consultation with the California Department of Toxic Substances Control (DTSC) staff. This assessment included evaluation of health risks to the following receptor populations:

- Commercial/hospital worker
- Construction worker
- Hospital inpatient at Miller Children's Hospital (child)
- Hospital inpatient at Long Beach Memorial Medical Center (adult and child)
- Off-site resident

The following exposure pathways were evaluated depending on the receptor population:

- Soil ingestion
- Dermal contact with soil
- Inhalation of soil particulates and volatiles released from soil
- Vapor intrusion

Cancer risks, non-cancer risk, cumulative non-cancer risks and risks due to lead exposure were all evaluated. Cancer risk for the commercial/hospital worker slightly exceeded the threshold of 1E-06 based on state and regulatory agency guidelines. The exceedance is based on potential exposure to polynuclear aromatic hydrocarbons (PAHs) in soil. Cancer risks for all other receptor populations evaluated were below the cancer risk threshold of 1E-06. It is expected that soils containing the main risk drivers (PAHs) are expected to removed as part of the removal action. Cumulative non-cancer risks, as measured by the Hazard Index, were all less than 1, indicating no significant risk of adverse non-cancer health effects. Lead risks indicated that lead risks were also insignificant for all receptor populations.

Appendix R.F

Miller Children's Hospital
Site Characterization Report

Please note that this is only a summary of the Miller Children's Hospital Site Characterization Report. The remaining 684 pages are available at the following locations by appointment:

City of Long Beach
333 West Ocean Boulevard
Long Beach, California 90802
(562) 570-6193

Sapphos Environmental, Inc.
133 Martin Alley
Pasadena, California 91105
(626) 683-3547

SITE CHARACTERIZATION REPORT LONG BEACH MEMORIAL MEDICAL CENTER EXPANSION OPERABLE UNIT 1: MILLER CHILDREN'S HOSPITAL AREA LONG BEACH, CALIFORNIA

Prepared for:

Long Beach Memorial Medical Center
2801 Atlantic Avenue
Long Beach, California 90801-1428

Prepared By:

SCS Engineers
3900 Kilroy Airport Way, Suite 100
Long Beach, California 90806
(562) 426-9544

April 2005
File No. 01203219.03 Task 1

This Site Characterization Report for Operable Unit 1: Miller Children's Hospital Expansion at the Long Beach Memorial Medical Center, 2801 Atlantic Avenue, Long Beach, California, dated April 2005, was prepared and reviewed by the following:

Michael L. Leonard, Sr., P.E.
Senior Technical Manager
Professional Engineer No. 31181

Kenneth H. Lister, Ph.D., C.E.G., C.Hg.
Professional Geologist No. 4338
SCS ENGINEERS

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SITE CHARACTERIZATION REPORT
LONG BEACH MEMORIAL MEDICAL CENTER EXPANSION
OPERABLE UNIT 1: MILLER CHILDREN'S HOSPITAL AREA
LONG BEACH, CALIFORNIA

1.0 INTRODUCTION AND BACKGROUND

1.1 General

SCS Engineers was retained by Long Beach Memorial Medical Center (LBMMC) to conduct an environmental review and site investigation of a portion of the LBMMC property immediately west of Atlantic Boulevard between Columbia Avenue and 27th Street (Figure 1). This area of the LBMMC campus has been designated as Operable Unit 1 (OU1) by the Department of Toxic Substances Control (DTSC). Construction of additional facilities for LBMMC has been proposed for OU1, including a new four-story inpatient building, central plant, a relocation of the drive-in entrance from Atlantic Avenue and other realigned on-site roads. OU1 also includes the bulk oxygen storage area located north of Columbia Avenue and west of Lakeview Drive. Figure 2 provides a map showing the location of the study area.

1.2 Previous OU1 Investigation

SCS conducted an investigation of OU1 in March and October 2004, the results of which were described in *Environmental Summary Report* (SCS, November 2004). The 2004 site investigation included a geophysical survey that confirmed the location of two oil wells indicated to be present on the site by review of historical information (see further discussion of oil well records search below in Historical Data Review). The site investigation also included subsurface soil sampling and analysis that encountered detectable concentrations of petroleum hydrocarbons in eight locations to varying degrees. Some of the areas of potential concern encountered are located directly under the proposed buildings, which are discussed, in the subsequent text.

1.3 Scope of Work and Objectives

The proposed construction involves the placement of buildings over a former ravine, which is classified as a closed solid waste disposal site by the California Integrated Waste Management Board (SWIS No. 19-AK-5018). The former ravine was historically filled using petroleum impacted soil and debris. The purpose of the tasks that were conducted, as described below, was to characterize environmental conditions in OU1 generally and to determine how these might impact proposed construction.

Environmental tasks conducted included the following:

- Data review and compilation of historic information. In addition to reports of previous investigations and oil production facility information, historic topographic maps and aerial photographs were reviewed.

- Geophysical investigation. Geophysical techniques were applied to attempt to locate inactive oil production and groundwater monitoring wells.

- Subsurface sampling and analysis. In March 2004, nine soil borings were advanced to total depths ranging from 20 to 50 feet below ground surface (bgs) and soil samples were collected at various depths. In October 2004, two additional soil borings were advanced to total depths of 56 and 61 feet and samples collected at various depths. In March 2005, 19 soil borings were advanced to total depths ranging from 15 to 50 feet bgs and soil samples were collected, generally at 5-foot vertical intervals. Samples were examined physically and boring logs were prepared. Soil samples were transported to a laboratory for chemical analysis that included total petroleum hydrocarbons (TPH) with carbon chain characterization by EPA Method 8015M, volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8310, semi-volatile organic compounds (SVOCs) by EPA Method 8270C, chlorinated pesticides by EPA Method 8081A, polychlorinated biphenyls (PCBs) by EPA Method 8082, and trace metals by various methods. Three of the borings advanced in March 2004 and 17 of the borings advanced in March 2005 were converted into soil gas probes for later sampling and analysis for VOCs, methane, and hydrogen sulfide.

- Compilation of data resulting from above listed activities and preparation of the Site Characterization Report.

- Input to Health and Risk Assessment (HRA) and Removal Action Workplan (RAW).

Results of these activities are described in the following sections of this report.

1.4 Geology/Hydrogeology

Geologically, the project area is located in the southwestern portion of the Los Angeles basin. The basin formed when basement (older) rocks were structurally downwarped allowing a sequence of Upper Cretaceous through Recent age sedimentary units to form (estimated fill thickness 12,000 feet). The rocks of the basin are cut by numerous faults, most strike-slip faults of generally northwest-southeast orientation. The closest active fault to the site is the Newport-Inglewood fault zone, known as the Cherry Hill segment, located approximately 1,000 feet northeast.

Surface elevation in the expansion area is between approximately 35 and 50 feet above mean sea level. The investigation area is located on the western flank of the Signal Hill uplift, approximately 1 mile east of the Los Angeles River and approximately 3 miles north of the Long Beach shoreline. Surficial geologic materials in the area consist of Pleistocene and Recent non-marine and marine units, predominantly sand, silty sand, sandy silt, silt, and clay. In addition, unclassified fill, including gravel, debris, and waste oil field material, was used to bring a former on-site ravine up to grade. Native and fill soils were encountered in borings drilled during the site investigation described in the present report. Because of the generally heterogeneous nature and thickness of the fill in portions of OU1, no typical soil section can be described that characterizes the area.

The uppermost regional aquifer in this area is anticipated to be the Gage, located at a depth of approximately 200 feet bgs. Uppermost groundwater beneath most of the area occurs at an estimated depth of 50 feet bgs within sands of the Lakewood Formation, however a thin perched zone or zones of groundwater were encountered as shallow as 3 feet bgs.

Appendix R.F

Todd Cancer Institute
Health Risk Assessment

Please note that this is only a summary of the draft document. The draft document is being reviewed by the Department of Toxic Substance Control, and will be available at the public outreach meeting on May 5th, 2005.

DRAFT
HUMAN HEALTH RISK ASSESSMENT
LONG BEACH MEMORIAL MEDICAL CENTER
OPERABLE UNIT 2: TODD CANCER INSTITUTE
LONG BEACH, CALIFORNIA

Prepared for:

Long Beach Memorial Medical Center
2801 Atlantic Avenue
Long Beach, California 90806-1737

Prepared by:

SCS Engineers
3900 Kilroy Airport Way, Suite 100
Long Beach, California 90806-6816
(562) 426-9544

April 2005
File No. 01203219.04, Task 9

This Human Health Risk Assessment report for the Long Beach Memorial Center, Operable Unit 2: Todd Cancer Institute located in the City of Long Beach, California, dated April 2005, was prepared and reviewed by the following:

Prepared by:

Allyson L. Baluyot

Allyson L. Baluyot
Staff Scientist

Paul Damian

Paul Damian, PhD, MPH, DABT
Risk Assessment Practice Leader
Board Certified Toxicologist

Reviewed by:

Michael L. Leonard, Sr.

Michael L. Leonard, Sr., PE
Project Manager

SCS ENGINEERS

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ED	Exposure Duration
EF	Exposure Frequency
EPC	Exposure Point Concentration
ES	Executive Summary
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HEAST	Health Effects Assessment Summary Tables
HERD	Human and Ecological Risk Division
HI	Hazard Index
HQ	Hazard Quotient
HRA	Health Risk Assessment
IR	Ingestion Rate
InhR	Inhalation Rate
IRIS	Integrated Risk Information System
J&E	Johnson and Ettinger
kg	Kilogram
km	Kilometer
LBMMC	Long Beach Memorial Medical Center
mg	Milligram
mi	Mile
mph	Miles Per Hour
MCH	Miller Children's Hospital
MSL	Mean Sea Level
NCEA	National Center for Environmental Assessment
NOAA	National Oceanic and Atmospheric Administration
ND	Not Detected
OEHHA	Office of Environmental Health Hazard Assessment
OU	Operable Unit
PAHs	Polycyclic Aromatic Hydrocarbons
PEF	Particulate Emission Factor

PRG	Preliminary Remediation Goal
PQL	Practical Quantification Limit
QA	Quality Assurance
QC	Quality Control
RfD	Reference Dose
RME	Reasonable Maximum Exposure
RWQCB	Regional Water Quality Control Board
SA	Skin Surface Area
sec	Second
SCS	SCS Engineers
SQL	Sample Quantification Limit
SS	Shallow Soil
TPH	Total Petroleum Hydrocarbons
TRPH	Total Recoverable Petroleum Hydrocarbons
TTEMI	Tetra Tech EMI, Inc.
μg	Microgram
USEPA	U. S. Environmental Protection Agency
UCLM	Upper Confidence Limit of the Arithmetic Mean
VOC	Volatile Organic Compound

HUMAN HEALTH RISK ASSESSMENT

LONG BEACH MEMORIAL MEDICAL CENTER

OPERABLE UNIT 2: TODD CANCER INSTITUTE AREA

LONG BEACH, CALIFORNIA

EXECUTIVE SUMMARY

A baseline human health risk assessment (HRA) was prepared for the Long Beach Memorial Medical Center Todd Cancer Institute expansion project. The project site has some historic chemical contamination associated with past oil production and gasoline service stations. Site contaminants have therefore consisted mostly of petroleum-product related chemicals such as benzene, toluene, ethylbenzene, xylene and total petroleum hydrocarbons.

An HRA was prepared consistent with state and federal risk assessment guidance to evaluate potential health risks associated with the project site. The general approach was developed in consultation with the California Department of Toxic Substances Control (DTSC) staff This assessment included evaluation of health risks to the following receptor populations:

- Commercial/hospital worker
- Construction worker
- Future outpatient at the Todd Cancer Institute (adult and child)
- Hospital inpatient at Long Beach Memorial Medical Center
- Off-site resident

The following exposure pathways were evaluated depending on the receptor population:

- Soil ingestion
- Dermal contact with soil
- Inhalation of soil particulates and volatiles released from soil
- Vapor intrusion

Cancer risks, non-cancer risks, cumulative non-cancer risks and risks due to lead exposure were all evaluated. All cancer risks were below the cancer risk threshold of 1E-06 and are considered negligible by all state and federal regulatory agencies. Cumulative non-cancer risks, as measured by the Hazard Index, were all less than 1, indicating no significant risk of adverse non-cancer health effects. Using the California Department of Toxic Substances Control Leadspread model to evaluate lead risks indicated that lead risks were also insignificant for all receptor populations.

Appendix R.F

Todd Cancer Institute
Site Characterization Report

Please note that this is only a summary of the Todd Cancer Institute Site Characterization Report. The remaining 782 pages are available at the following locations by appointment:

City of Long Beach
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SITE CHARACTERIZATION REPORT LONG BEACH MEMORIAL MEDICAL CENTER EXPANSION OPERABLE UNIT 2: TODD CANCER INSTITUTE AREA LONG BEACH, CALIFORNIA

Prepared for:

Long Beach Memorial Medical Center
2801 Atlantic Avenue
Long Beach, California 90801-1428

Prepared By:

SCS Engineers
3900 Kilroy Airport Way, Suite 100
Long Beach, California 90806
(562) 426-9544

April 2005
File No. 01203219.04 Task 1

This Site Characterization Report for Operable Unit 2: Todd Cancer Institute Area at the Long Beach Memorial Medical Center, 2801 Atlantic Avenue, Long Beach, California, dated April 2005, was prepared and reviewed by the following:

Michael L. Leonard, Sr.

Michael L. Leonard, Sr., P.E.
Professional Engineer No. 31181
Senior Technical Manager

Kenneth H. Lister, Ph.D., C.E.G., C.Hg.
Professional Geologist No. 4338
Project Manager
SCS ENGINEERS

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SITE CHARACTERIZATION REPORT
LONG BEACH MEMORIAL MEDICAL CENTER EXPANSION
OPERABLE UNIT 2: TODD CANCER INSTITUTE AREA
LONG BEACH, CALIFORNIA

1.0 INTRODUCTION AND BACKGROUND

1.1 General

SCS Engineers was retained by Long Beach Memorial Medical Center (LBMMC) to conduct an environmental review and site investigation, in connection with California Environmental Quality Act (CEQA) activities, for an approximately 7.5 acre portion of the LBMMC property located at the southeast corner of Spring Street and Long Beach Boulevard (Figure 1). Construction of additional facilities for LBMMC has been proposed for this area, including a building for outpatient cancer services. Figure 2 is a map of the study area. This area of the LBMMC campus has been designated as Operable Unit 2 (OU2) by the Department of Toxic Substances Control (DTSC).

1.2 Previous OU2 Investigation

SCS conducted an investigation of OU2 in September and October 2004,the results of which were described in *Environmental Summary Report* (SCS, November 2004). The 2004 site investigation included a geophysical survey that confirmed the location of two of four oil wells indicated to be present on the site by review of historical information. The site investigation also included subsurface soil sampling and analysis that encountered detectable concentrations of petroleum hydrocarbons in one location. In addition, collection and analysis of 31 soil gas samples from 27 subsurface vapor probes detected low concentrations of petroleum related volatile organic compounds (VOCs) in four samples (highest concentrations of toluene, m- and p-xylenes, and benzene in these samples was 2.1, 2.2, and 6.8 ug/l, respectively). None of the areas of potential concern encountered are located directly under the proposed buildings.

1.3 Scope of Work and Objectives

The proposed construction involves the placement of a three story building in the northwestern portion of OU2, to be followed by a two story horizontal building expansion several years later. The construction area is currently used as a surface parking lot. Historical uses of OU2 include oil production and a gas station. The purpose of the tasks that were conducted, as described below, was to evaluate environmental conditions in the area generally and to determine how these might impact proposed construction.

Environmental tasks included the following:

- Data review and compilation of historic information. In addition to reports of previous investigations and oil production facility information, historic topographic maps and aerial photographs were reviewed.

- Geophysical investigation. Geophysical techniques were applied to attempt to locate inactive oil production wells, underground storage tanks, pipelines, and similar subsurface features.

- Subsurface sampling and analysis. In October 2004, twenty-seven temporary soil vapor probes were installed at a depth of five feet bgs and soil vapor samples were collected. Five soil borings were advanced to total depths ranging from 30 to 55 feet bgs for both geotechnical and environmental purposes, and soil samples were collected. One additional soil boring was sampled at 5 feet and 10 feet bgs. In March 2005, 27 soil borings were advanced to total depths ranging from 17 to 30 feet bgs for both geotechnical and environmental purposes, and soil samples were collected. Samples were examined physically and boring logs were prepared. Selected soil samples were transported to a laboratory for chemical analysis that included total petroleum hydrocarbons (TPH) with carbon chain characterization by EPA Method 8015M, volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8310, semi-volatile organic compounds (SVOCs) by EPA Method 8270C, chlorinated pesticides by EPA Method 8081A, polychlorinated biphenyls (PCBs) by EPA Method 8082, and trace metals by various methods. Twenty-three of the borings advanced in March 2005 were converted into soil vapor probes for later field testing.

- Compilation of data resulting from above listed activities and preparation of the Site Characterization Report.

- Input to Health Risk Assessment (HRA) and Removal Action Workplan (RAW).

Results of these activities are described in the following sections of this report.

1.4 Geology/Hydrogeology

Geologically, the project area is located in the southwestern portion of the Los Angeles basin. The basin formed when basement (older) rocks were structurally downwarped allowing a sequence of Upper Cretaceous through Recent age sedimentary units to form (estimated fill thickness 12,000 feet). The rocks of the basin are cut by numerous faults, most strike-slip faults of generally northwest-southeast orientation. The closest active fault to the site is the Newport-Inglewood fault zone, known as the Cherry Hill segment, located approximately 1,000 feet northeast.

Surface elevation in the expansion area is between approximately 45 and 50 feet above mean sea level. The investigation area is located on the western flank of the Signal Hill uplift, approximately 1 mile east of the Los Angeles River and approximately 3 miles north of the Long Beach shoreline. Surficial geologic materials in the area consist of Pleistocene and Recent non-marine and marine units, predominantly sand, silty sand, sandy silt, silt, and clay. Native and fill soils were encountered in borings drilled during the site investigation described in the present report.

The uppermost regional aquifer in this area is anticipated to be the Gage, located at a depth of approximately 200 feet below ground surface (bgs). Uppermost groundwater beneath most of the area occurs at an estimated depth of 50 feet bgs within sands of the Lakewood Formation. Groundwater was encountered in the two deepest borings drilled during September 2004, but not encountered in any of the March 2005 borings.

The following field observations are considered particularly relevant to the purpose of the investigation:

- The upper two to three feet bgs is relatively new fill, possibly related to parking lot construction. An additional two to six feet below this may be older fill.
- Between the base of fill and a depth of approximately 20 feet bgs, soil consisting predominantly of sandy silt to silty sand was encountered.
- Below the sandy silt/silty sand, a section of up to approximately 22 to 26 feet bgs of sand was encountered.
- Below the sand, to a depth of 35+ feet, silty sand with some clay was encountered.
- Between approximately 37 to 60 feet bgs, in the two borings that went to this depth, drilling encountered predominantly sandy silt with some clay with a few cleaner sand lenses.

Appendix L

Voluntary Clean-up Agreement

Department of Toxic Substances Control

Alan C. Lloyd, Ph.D.
Agency Secretary
Cal/EPA

5796 Corporate Avenue
Cypress, California 90630

Arnold Schwarzenegger
Governor

February 16, 2005

Nuna Tersibashian, R.E.A.
Environmental Analyst
Sapphos Environmental, Inc.
133 Martin Alley
Pasadena, California 91105

VOLUNTARY CLEANUP AGREEMENT, DOCKET NUMBER HSA-A 04/05-116,
LONG BEACH MEMORIAL MEDICAL CENTER, 2801 ATLANTIC AVENUE,
LONG BEACH CALIFORNIA 90801

Dear Ms. Tersibashian:

Enclosed for your files are two fully executed duplicate originals of the Voluntary Cleanup Agreement for the subject Site. The Agreement will cover the Department of Toxic Substances Control (DTSC) review and comment on the Supplemental Site Investigation Work Plan, and oversight for the completion and implementation of a Removal Action Work Plan (RAW) at the proposed expansion areas. DTSC's oversight of the site characterization and RAW of the existing facility will also be covered by this Agreement.

DTSC has designated Ms. Maryam Tasnif-abbasi as the Project Manager. She will be responsible for the technical interface with you and/or your environmental consultant. Ms. Tasnif-abbasi can be reached by telephone at (714) 484-5489.

As noted in the Agreement, the advance payment is due within 10 days of Agreement execution. It is important that the following information be clearly marked on the face of the check: "Docket Number HSA-A 04/05-116 and CalStars Site Code 401276-11". The advance payment should be sent directly to:

Department of Toxic Substances Control
Accounting/Cashier
400 P Street, 4th Floor
P.O. Box 806
Sacramento, California 95812-0806

A photocopy of the check should be sent to my attention at the letterhead address.

STATE OF CALIFORNIA
ENVIRONMENTAL PROTECTION AGENCY
DEPARTMENT OF TOXIC SUBSTANCES CONTROL

In the Matter of:	)	Docket No. HSA-A 04/05-116
	)	
Long Beach Memorial Medical Center	)	Voluntary Cleanup Agreement
	)	
Project Proponent Long Beach Memorial Medical Center 2801 Atlantic Avenue Long Beach, CA 90806-1737	)	Health and Safety Code Section 25355.5(a) (1) (C)

I. INTRODUCTION

1.1 Parties. The California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) enters into this Voluntary Cleanup Agreement (Agreement) with Long Beach Memorial Medical Center (LBMMC) (Proponent).

1.2 Site. The property which is the subject of this Agreement (Site) is located at 2801 Atlantic Avenue, California 90806-1737. The Site property consists of 54 acres and is identified by Assessor's Parcel Number 7207-010-041. A diagram of the Site and a location map are attached as Exhibit A and Exhibit B.

1.3 Jurisdiction. This Agreement is entered into by DTSC and Proponent pursuant to Health and Safety Code (H&SC) section 25355.5(a) (1) (C). This section authorizes DTSC to enter into an enforceable agreement with Proponents to oversee the characterization and cleanup of a Site.

1.4 Purpose. The purpose of this Agreement is for the Proponent to develop a work plan for site characterization, implement the work plan, and conduct a removal action, if warranted, under the oversight of DTSC. The purpose of this Agreement is also for DTSC to obtain reimbursement from the Proponent for DTSC's oversight costs.

II. BACKGROUND

2.1 Ownership. The Site is owned by LBMMC.

2.2 Substances Found at the Site. Reports, containing the results of environmental media sampling conducted at the Site, indicate that some of the soil is contaminated with hazardous substances, including petroleum hydrocarbons, volatile organic compounds, and metals.

2.3 Physical Description. The 54 acre Long Beach Memorial Medical Center Campus is completely developed. There are approximately 1,213,945 gross square feet of structures located here. The proposed project is divided into three Operable Units (OUs).

OU1 is the area of construction of the Miller Children's Hospital, which is proposed to be a four story acute care or pediatric inpatient tower building with an anticipated footprint of 37,000 square feet. The proposed construction will overlap the existing parking structure located east of the existing Miller Children's Hospital. Construction will also include a central plant and utility trench, and bulk oxygen tank enclosure, and realignment of the LBMMC entrance. OU2 is currently an empty lot at the corner of Spring Street and Long Beach Boulevard and is site of proposed Todd Cancer Institute. Proposed construction includes two and three story buildings comprising a total of 126,000 square feet. OU1 and OU2 will be managed under a single site code.

OU3 comprises of the remaining portions of the LBMMC facility, i.e., the campus bounded by Spring Street, Long Beach Boulevard, Atlantic Avenue and 27th Street. OU3 will be managed under a unique site code.

2.4 Site History. The existing hospital complex was constructed in 1959. Historically, the site was used for oil production, including oil wells, storage tanks, derricks and associated equipment. A portion of the site is listed as a closed landfill on the California Integrated Waste Management Board's Solid Waste Information System. Past environmental investigations have shown detectable concentrations of hydrocarbon compounds, metals, and volatile organic compounds in the soil.

The expansion of the Miller Children's Hospital will be located immediately adjacent to the existing building, southwest of the intersection of Atlantic Avenue and Columbia Street. The expansion area itself has been a parking structure since approximately 1970. This structure will be demolished to accommodate construction. The proposed project site history indicates that this area was a natural ravine and a former oil field. Over time, the oil wells were abandoned, and the ravine was backfilled with soil and oil field waste.

According to previous site assessments of the Todd Cancer Institute property (OU 2), from approximately 1925 through 1935 a gasoline service station was located in the northwestern corner of this parcel. From 1925 to 1950, a welding shop was located immediately west of the gas station site. An underground storage tank (UST) was installed at the welding shop in 1944. Although no records have been found documenting the removal of USTs from either one of the previously mentioned facilities, geophysical surveys conducted in May 2004 did not indicate the presence of USTs at the site. Oil production facilities were located along the northeast corner of the site from the 1920's through the 1970's. The site has been used as a parking lot since 1985.

III. AGREEMENT

3.0 IT IS HEREBY AGREED THAT DTSC will provide review and oversight of the response activities conducted by the Proponent in accordance with the Scope of Work contained in Exhibit C. The Proponent shall conduct the activities in the manner specified herein and in accordance with the schedule specified in Exhibit E. All work shall be performed consistent with H&SC section 25300 et seq., as amended; the National Contingency Plan (40 Code of Federal Regulations (CFR) Part 300), as

3.6 Communications. All DTSC approvals and decisions made regarding submittals and notifications will be communicated to the Proponent in writing by DTSC's Agreement Manager or his/her designee. No informal advice, guidance, or suggestions or comments by DTSC regarding reports, plans, specifications, schedules or any other writings by the Proponent shall be construed to relieve the Proponent of the obligation to obtain such written approvals.

3.7 Endangerment during Implementation. In the event DTSC determines that any activity (whether or not pursued in compliance with this Agreement) may pose an imminent or substantial endangerment to the health and safety of people on the Site or in the surrounding area or to the environment, DTSC may order the Proponent to stop further implementation of this Agreement for such period of time as may be needed to abate the endangerment.

3.8 Payment. The Proponent agrees to pay (1) all costs incurred by DTSC in association with preparation of this Agreement and for review of documents submitted prior to the effective date of the Agreement, and (2) all costs incurred by DTSC in providing oversight pursuant to this Agreement including review of the documents described in Exhibit C and associated documents, and in providing oversight of field activities. An estimate of DTSC's oversight costs is attached as Exhibit D. It is understood by the parties that Exhibit D is an estimate and cannot be relied upon as the final cost figure. DTSC will bill the Proponent quarterly. Proponent agrees to make payment within sixty (60) days of receipt of DTSC's billing. Such billings will reflect any amounts that have been advanced to DTSC by the Proponent.

3.8.1 In anticipation of services to be rendered, Proponent shall make an advance payment of $20,000 to DTSC. That payment shall be made no later than ten (10) days after this Agreement is fully executed. If the Proponent's advance payment does not cover all costs payable to DTSC under this paragraph, Proponent agrees to pay the additional costs within sixty (60) days of receipt of a bill from DTSC.

3.8.2 If any bill is not paid by the Proponent within sixty (60) days after it is sent by DTSC, the Proponent may be deemed to be in material default of this Agreement.

3.8.3 All payments made by the Proponent pursuant to this Agreement shall be by a Long Beach Memorial Medical Center's check or cashier's or certified check made payable to the "Department of Toxic Substances Control", and bearing on its face the project code for the site (Calstars Site Codes #401276 for OU1 and OU2 and #401277 for OU3) and the docket number (Docket No. Docket No. HSA-A 04/05-116) of this Agreement. Payments shall be sent to:

Department of Toxic Substances Control
Accounting/Cashier
1001 I Street, 21st Floor
P.O. Box 806
Sacramento, California 95812-0806

A photocopy of the check shall be sent concurrently to DTSC's Agreement Manager.

3.8.4 If the advance payment exceeds DTSC's actual oversight costs, DTSC will provide an accounting for expenses and refund the difference within one hundred-twenty (120) days after termination of this Agreement in accordance with Paragraph

3.9 Condition Precedent. It is expressly understood and agreed that DTSC's receipt of the advance payment described in Paragraph 3.8.1. is a condition precedent to DTSC's obligation to provide oversight, review and/or comment on documents.

3.10 Record Retention. DTSC shall retain all cost records associated with the work performed under this Agreement for such time periods as may be required by applicable state law. The Proponent may request to inspect all documents which support DTSC's cost determination in accordance with the Public Records Act, Government Code section 6250 et seq.

3.11 Project Coordinator. The work performed pursuant to this Agreement shall be under the direction and supervision of a qualified project coordinator, with expertise in hazardous substance site cleanup. The Proponent shall submit: a) the name and address of the project coordinator; and b) in order to demonstrate expertise in hazardous substance site cleanup, the resume of the coordinator. The Proponent shall promptly notify DTSC of any change in the identity of the Project Coordinator. All engineering and geological work shall be conducted in conformance with applicable state law including but not limited to Business and Professions Code sections 6735 and 7835.

3.12 Access. Proponent shall provide, and/or obtain access to the Site and offsite areas to which access is necessary to implement this Agreement. Such access shall be provided to DTSC's employees, contractors, and consultants at all reasonable times. Nothing in this paragraph is intended or shall be construed to limit in any way the right of entry or inspection that DTSC or any other agency may otherwise have by operation of any law. DTSC and its authorized representatives shall have the authority to enter and move freely about all property at the Site at all reasonable times for purposes including, but not limited to: inspecting records, operating logs, sampling and analytic data, and contracts relating to this Site; reviewing the progress of the Proponent in carrying out the terms of this Agreement; conducting such tests as DTSC may deem necessary; and verifying the data submitted to DTSC by the Proponent.

3.13 Sampling, Data and Document Availability. When requested by DTSC, the Proponent shall make available to DTSC, and shall provide copies of, all data and information concerning contamination at the Site, including technical records and contractual documents, sampling and monitoring information and photographs and maps, whether or not such data and information was developed pursuant to this Agreement.

3.14 Notification of Field Activities. The Proponent shall inform DTSC at least seven (7) days in advance of all field activities pursuant to this Agreement and shall allow DTSC and its authorized representatives to take duplicates of any samples collected by the Proponent pursuant to this Agreement.

3.15 Notification of Environmental Condition. The Proponent shall notify DTSC's Agreement Manager immediately upon learning of any condition posing an immediate threat to public health or safety or the environment. Within seven (7) days of the onset of such a condition, the Proponent shall furnish a report to DTSC, signed by the Proponent's Agreement Manager, setting forth the events which occurred and the measures taken in the response thereto.

3.16 Preservation of Documentation. The Proponent shall maintain a central repository of the data, reports, and other documents prepared pursuant to this

Agreement. All such data, reports and other documents shall be preserved by the Proponent for a minimum of six (6) years after the conclusion of all activities carried out under this Agreement. If DTSC requests that some or all of these documents be preserved for a longer period of time, the Proponent shall either comply with that request, deliver the documents to DTSC, or permit DTSC to copy the documents prior to destruction. The Proponent shall notify DTSC in writing at least ninety (90) days prior to the expiration of the six-year minimum retention period before destroying any documents prepared pursuant to this Agreement. If any litigation, claim, negotiation, audit or other action involving the records has been started before the expiration of the six year period, the related records shall be retained until the completion and resolution of all issues arising therefrom or until the end of the six-year period, which ever is later.

3.17 Amendments. This Agreement may be amended or modified solely upon written consent of all parties. Such amendments or modifications may be proposed by any party and shall be effective the third business day following the day the last party signing the amendment or modification sends its notification of signing to the other party. The parties may agree to a different effective date.

3.18 Termination for Convenience. Except as otherwise provided in this Paragraph, each party to this Agreement reserves the right unilaterally to terminate this Agreement for any reason. Termination may be accomplished by giving a thirty (30) day advance written notice of the election to terminate this Agreement to the other Party. In the event that this Agreement is terminated under this Paragraph, the Proponent shall be responsible for DTSC costs through the effective date of termination.

3.19 Exhibits. All exhibits attached to this Agreement are incorporated herein by this reference.

3.20 Time Periods. Unless otherwise specified, time periods begin from the date this Agreement is fully executed, and "days" means calendar days. "Business days" means all calendar days that are not weekends or official State holidays.

3.21 Proponent Liabilities. Nothing in this Agreement shall constitute or be considered a satisfaction or release from liability for any condition or claim arising as a result of Proponent's past, current, or future operations. Nothing in this Agreement is intended or shall be construed to limit the rights of any of the parties with respect to claims arising out of or relating to the deposit or disposal at any other location of substances removed from the Site.

3.22 Government Liabilities. The State of California (State) shall not be liable for any injuries or damages to persons or property resulting from acts or omissions by the Proponent or by related parties in carrying out activities pursuant to this Agreement, nor shall the State of California be held as a party to any contract entered into by the Proponent or its agents in carrying out the activities pursuant to this Agreement.

3.23 Third Party Actions. In the event that the Proponent is a party to any suit or claim for damages or contribution relating to the Site to which DTSC is not a party, the Proponent shall notify DTSC in writing within ten (10) days after service of the complaint in the third-party action. Proponent shall pay all costs incurred by DTSC relating to such third-party actions, including but not limited to responding to subpoenas.

3.24 Reservation of Rights. DTSC and the Proponent reserve the following rights.

3.24.1 DTSC reserves its right to pursue cost recovery under the Comprehensive Environmental Response, Compensation and Liability act of 1980 (CERCLA), as amended, the California Health and Safety Code section 25360, and any other applicable section of the law.

3.24.2 Nothing in this Agreement is intended or shall be construed to limit or preclude DTSC from taking any action authorized by law or equity to protect public health and safety or the environment and recovering the costs thereof.

3.24.3 Nothing in this Agreement shall constitute or be construed as a waiver of the Proponent's rights, (including any covenant not to sue or release) with respect to any claim, cause of action, or demand in law or equity that the Proponent may have against any "person", as defined in Section 101(21) of CERCLA, or Health and Safety Code section 25319, that is not a signatory to this Agreement.

3.24.4 By entering into this Agreement, Proponent does not admit to any fact, fault or liability under any statute or regulation.

3.25 Compliance with Applicable Laws. Nothing in this Agreement shall relieve the Proponent from complying with all applicable laws and regulations, and the Proponent shall conform all actions required by this Agreement with all applicable federal, state and local laws and regulations.

3.26 California Law. This Agreement shall be governed, performed and interpreted under the laws of the State of California.

3.27 Severability. If any portion of this Agreement is ultimately determined not to be enforceable, that portion will be severed from the Agreement and the severability shall not affect the enforceability of the remaining terms of the Agreement.

3.28 Parties Bound. This Agreement applies to and is binding, jointly and severally, upon each signatory and its officers, directors, agents, receivers, trustees, heirs, executors, administrators, successors, and assigns, and upon any successor agency of the State of California that may have responsibility for and jurisdiction over the subject matter of this Agreement. No change in the ownership or corporate or business status of any signatory, or of the facility or Site shall alter any signatory's responsibilities under this Agreement.

3.29 Effective Date. The effective date of this Agreement is the date when this Agreement is fully executed.

3.30 Representative Authority. Each undersigned representative of the parties to this Agreement certifies that she or he is fully authorized to enter into the terms and conditions of this Agreement and to execute and legally bind the parties to this Agreement.

3.31 Counterparts. This Agreement may be executed and delivered in any number of counterparts, each of which when executed and delivered shall be deemed to be an original, but such counterparts shall together constitute one and the same document.

_______________ Date: 2/15/05

Thomas M. Cota,
Southern California Cleanup Operations Branch -
Cypress Office
Department of Toxic Substances Control

_______________ Date: 2-15-05

Pat Johner, Vice President, Facilities
Long Beach Memorial Medical Center

EXHIBITS

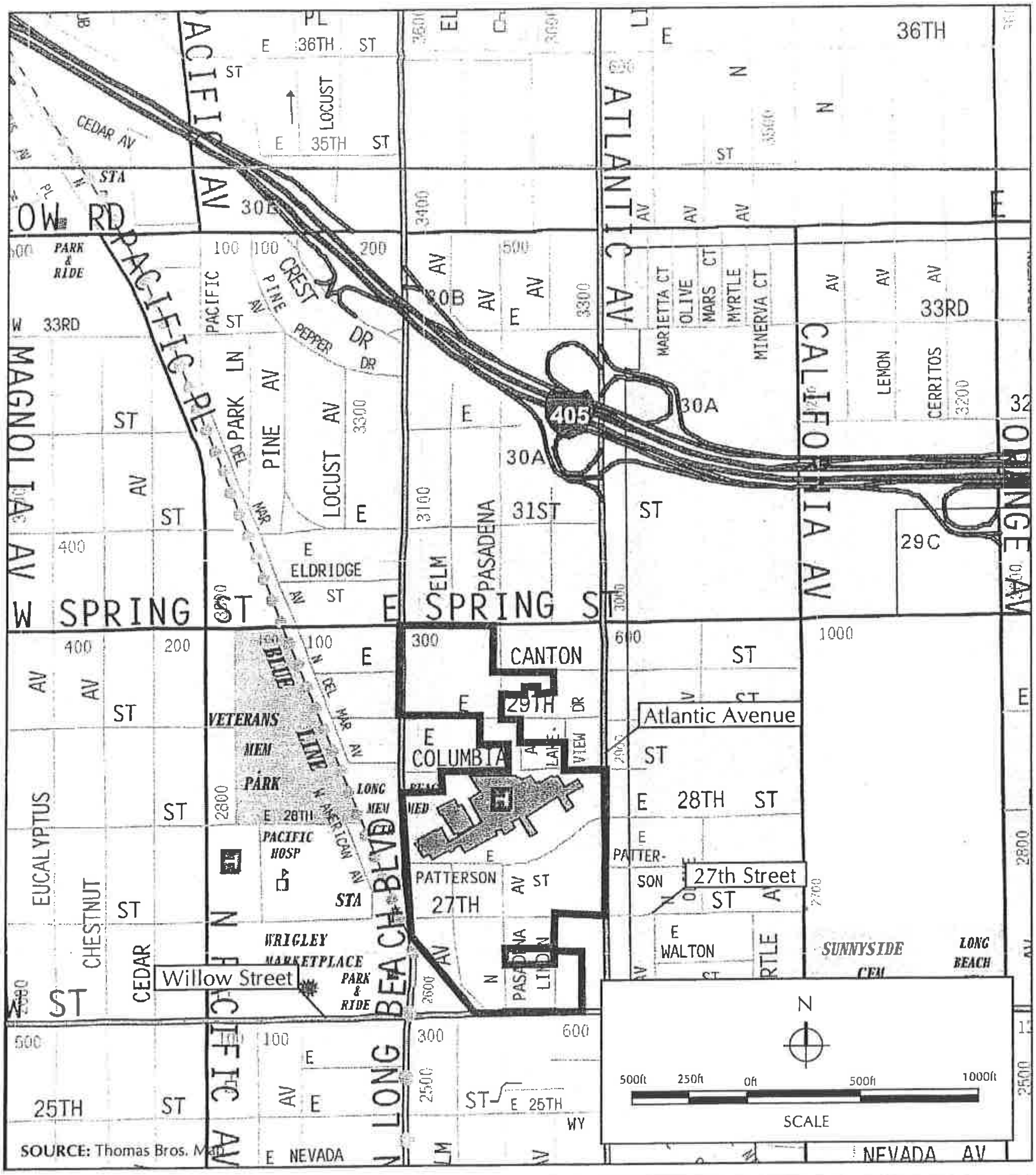
A - SITE DIAGRAM

B - SITE LOCATION MAP

C - SCOPE OF WORK

D - COST ESTIMATE

E - SCHEDULE



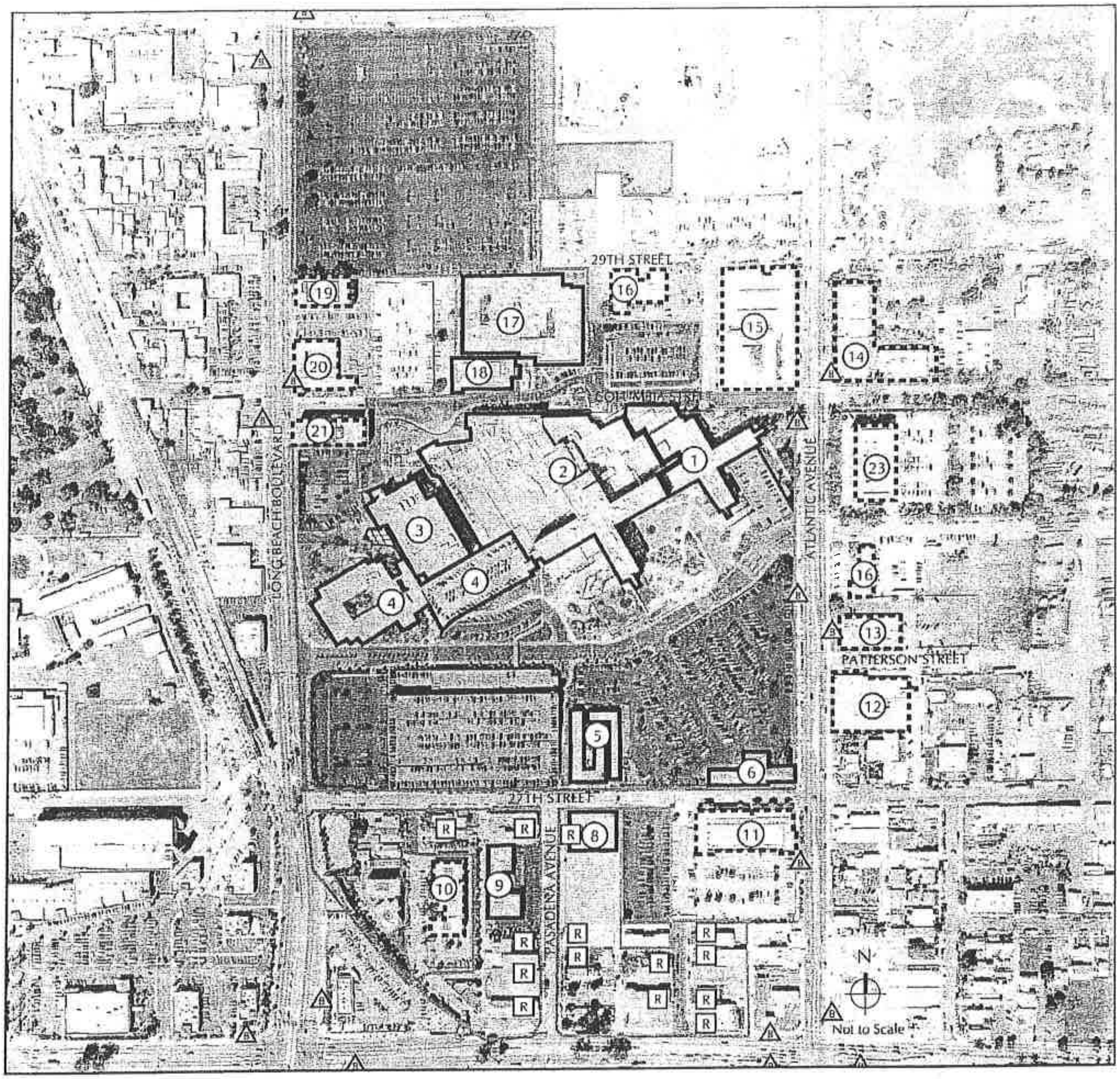
SOURCE: Thomas Bros. Map

LEGEND

Long Beach Memorial Medical Center Campus Boundary

FIGURE 1

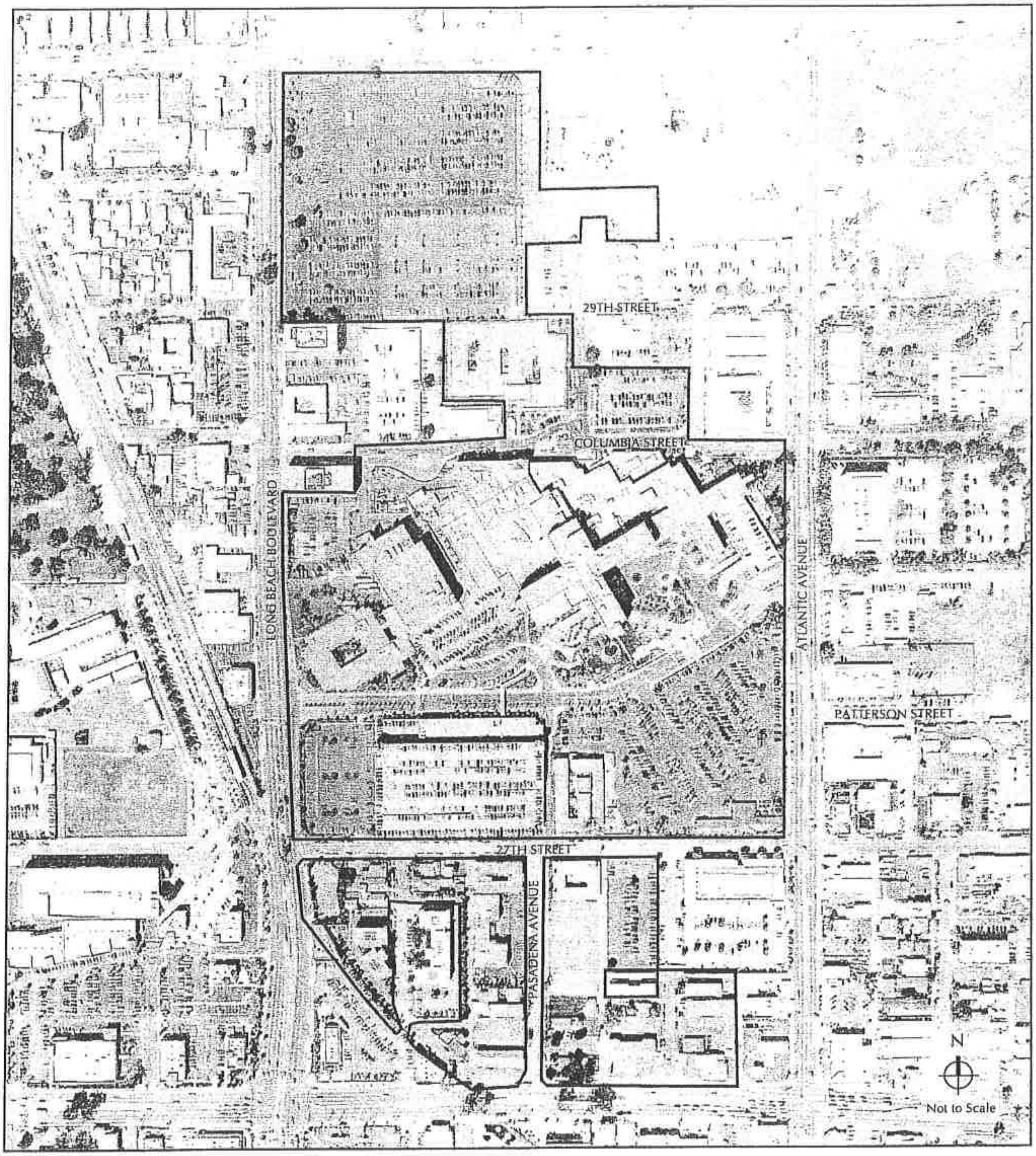
Long Beach Memorial Medical Center Location



LEGEND

- Inpatient
- Outpatient
- Mixed Use
- Utilities
- Circulation
- Parking
- LBMMC Boundary
- Buildings Controlled by LBMMC
- Buildings Controlled by Others
- Blue Line (Willow Station)
- Bus Stop (Long Beach Transit)
- 1 Miller Children's Hospital
- 2 Long Beach Memorial Medical Center
- 3 Administration Building
- 4 West Facility/Rehabilitation Building
- Rehabilitation Gym/Parking
- 5 Miller House
- 6 Ranch House / WIC Medical Center
- 8 Memorial Guest Residence
- 9 Research Building
- 10 Elm Medical Plaza
- 11 3-Story Medical Office Building
- 12 Convalescent Home
- 13 MOB with CT & MRI Orthopedics
- 14 Hillside Medical Plaza
- 15 2-Story Atlantic MOB
- 16 Medical Office Building - 1 Story
- 17 Buffums Plaza - 1 Story
- 18 CT & MRI Center
- 19 Medical Office Building
- 20 Aloha Motel
- 21 Medical Office Building
- 23 4-Story Atlantic MOB
- R Residential Buildings

FIGURE 2
Existing Conditions



LEGEND

- OU Boundary 1
- OU Boundary 2
- OU Boundary 3
- LBMMC Boundary

FIGURE 3
OU Boundaries

EXHIBIT C

SCOPE OF WORK

The Agreement with the Long Beach Memorial Medical Center addresses three areas. OU1, the Miller Children's Hospital expansion area, OU2, the Todd Cancer Institute, and OU3, the remaining portion of the Long Beach Memorial Medical Center. Activities at OU1 and OU2 are anticipated to run concurrently in order to support proposed construction activities. OU3 activities will be conducted as required by DTSC.

The following Tasks will be completed as part of this Agreement:

TASK 1. Review of Existing Data

The Proponents will ensure that DTSC has all background information, sample analysis, environmental assessment reports, and any other information pertinent to the Site which Proponents have in their possession. DTSC will review the information, identify areas and media of concern, and determine what additional work, if any, is required to complete the Site Characterization, including work required to determine the extent of any off-site contamination.

TASK 2. Site Characterization

The Proponents shall submit a Workplan describing the activities proposed to characterize soil contamination associated with OU1 and 2 including determination of the extent of any off-site contamination.

2.1 Site Characterization Objectives

(a) Characterize the extent of hazardous substance contamination at the OU 1 and 2
(b) Identify existing and potential migration pathways;
(c) Analyze the baseline risks to help determine the need for action at OU1 and 2;
(d) Determine levels of chemicals that can remain onsite and still be adequately protective of human health in residential use.

2.2 Site Characterization Workplan

Proponents shall prepare a Site Characterization Workplan, which will include an implementation schedule which will address determination of the extent of any off-site contamination.

2.3 Site Characterization Report

Proponents shall prepare a Site Characterization report that summarizes the results of Site Characterization activities, including presentation and interpretation of all data and information generated and/or compiled. The Site Characterization report will contain:

(a) Site Background Information, including Physical Characteristics and Site History
(b) Sources of Contamination
(c) Summary of Investigation, discuss all media investigated (i.e., Soil, Geology)
(d) Nature and Extent of Contamination

Task 3. Health-Based Risk Assessment

Proponents will prepare an HRA report. The report will be prepared consistent with U.S. EPA Risk Assessment Guidance for Superfund (EPA/540/1-89/002) and DTSC Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities. The HRA report must include the following components:
(a) Contaminant Identification
(b) Exposure Assessment
(c) Toxicity Assessment
(d) Risk Characterization
(e) Environmental Evaluation
(f) Soil Remediation Goals (e.g. NFA or equivalent with no deed restriction)

TASK 4. Removal Action Workplan

If DTSC determines a removal action is appropriate, the Proponents will prepare a Removal Action Workplan (RAW) in accordance with Health and Safety Code sections 25323.1 and 25356.1. The Removal Action Workplan will include:

(a) a description of the onsite contamination;
(b) the goals to be achieved by the removal action;
(c) an analysis of the alternative options considered and rejected and the basis for that rejection. This should include a discussion for each alternative which covers its effectiveness, implementability

and cost;

(d) administrative record list; and

(e) a statement that the RAW serves as an equivalent document to the Engineering Evaluation/Cost Analysis document required by the National Contingency Plan.

If the proposed removal action does not meet the requirements of Health and Safety Code section 25356.1(h), the Proponents will prepare a Remedial Action Plan (RAP) in accordance with Health and Safety Code section 25356.1(c) for DTSC review and approval.

TASK 5. California Environmental Quality Act (CEQA).

DTSC will prepare the necessary CEQA documents. If required, the Proponent shall submit the information necessary for DTSC to prepare these documents.

TASK 6. Implementation of Final Removal Action Workplan.

Upon DTSC approval of the final Removal Action Workplan (RAW), the Proponents shall implement the removal action, as approved. Within thirty (30) days of completion of field activities, Proponents shall submit an Implementation Report documenting the implementation of the final RAW.

TASK 7. Changes During Implementation of the Final RAW.

During implementation of the final RAW, DTSC may specify such additions, modifications and revisions to the RAW as deemed necessary to protect human health and safety or the environment or to implement the RAW.

TASK 8. Public Participation.

8.1 The Proponents shall conduct appropriate public participation activities given the nature of the community surrounding OU1 and 2 and the level of community interest. Proponents shall work cooperatively with DTSC to ensure that the affected and interested public and community are involved in DTSC's decision-making process. Any such public participation activities shall be conducted in accordance with Health and Safety Code sections 25358.7, the DTSC Public Participation Policy and Procedures Manual, and with DTSC's review and approval.

8.2 The Proponents shall prepare a community profile to examine the level of the community's knowledge of the Site; the types of community concerns; the proximity of the Site to homes and/or schools, day care facilities, churches, etc.; the current and proposed use of the Site; media interest; and involvement of community groups and elected officials.

8.3 The Proponents shall develop and submit fact sheets to DTSC for review and approval when specifically requested by DTSC. Proponents shall be responsible for printing and distribution of fact sheets upon DTSC approval using the approved community mailing list.

8.4 The Proponents shall publish, in a major local newspaper(s), a public notice announcing the availability of the RAW for public review and comment. The public comment period shall last a minimum of thirty (30) days.

8.5 DTSC may require that the Proponents hold at least one public meeting to inform the public of the proposed activities and to receive public comments on the RAW.

8.6 Within two (2) weeks of the close of the public comment period, the Proponents shall prepare and submit to DTSC a draft response to the public comments received.

8.7 If appropriate, the Proponents will revise the RAW on the basis of comments received from the public, and submit the revised RAW to DTSC for review and approval. The Proponents will also notify the public of any significant changes from the action proposed in the RAW.

TASK 9. Quality Assurance/Quality Control (QA/QC) Plan.

All sampling and analysis conducted by the Proponents under this Agreement shall be performed in accordance with a QA/QC Plan submitted by the Proponents and approved by DTSC. The QA/QC Plan will describe:

(a) the procedures for the collection, identification, preservation and transport of samples;
(b) the calibration and maintenance of instruments;
(c) the processing, verification, storage and reporting of data, including chain of custody procedures and identification of qualified person(s) conducting the sampling and of a laboratory certified or approved by DTSC pursuant to Health and Safety Code section 25198; and
(d) how the data obtained pursuant to this Agreement will be managed and preserved in accordance with the Preservation of Documentation section of this Agreement.

EXHIBIT D

COST ESTIMATE WORKSHEET

VOLUNTARY CLEANUP AGREEMENT

Project Name: Long Beach Memorial Medical Center Expansion Areas: Miller Children's Hospital (OU1) & Todd Cancer Institute (OU2)

Title	VCP Coord.	Project Manager		Supervisor		Toxicology	Geology	Industrial Hygiene	HQ Engring	Public Particip	HQ CEQA	Legal	Clerical
Classification	Sr. HSS	HSS	HSE	HSSI	HSEI	Staff Toxicologist	Eng Geol.	Assoc IH	HSE	PPS	AEP	Staff Counsel	WPT
TASK: Agreement Prep./Negotiation		8		4									
Scoping Documents: HSP/SAP/QAP													
Review and comment on existing data and Preliminary Endangerment Assessment (PEA) equivalent documents and provide general project oversight[1].		8		4		12	12						2
Site Characterization													
- Workplan[2]		8		4		8	8						2
- Implementation[3]		4		2			8						
- Report[4]		32		8			24						2
Risk Assessment		16				40							
Public Participation		4								24			
CEQA[5]													
Removal Action Workplan[6]		32		12		24	24			16			
Implement Removal Action		12					4						
Design													
Remedial Action Plan (RAP)													
Certification		12		2		8							
Deed Restriction		16		2								16	2
Operation & Maint													
Total No. Hours/Class		144	0	34	0	92	80	0	0	40	0	0	8
Hourly Rate/Class		111	123	128	135	150	123	116	123	104	109	153	52
Cost/Class		15984	0	4352	0	13800	9840	0	0	4160	0	0	416
Grand Total Cost	$48,552												

14-Feb-05

Cost Assumptions:

[1] The Project Manager will conduct a review of the reports provided.
The Geologist and the Toxicologist will also perform reviews of the existing data to facilitate discussions with the proponent with regards to the expectations of the Sampling and Analysis Plan Significant historical data exist which need to be evaluated. A site visit will be conducted prior to work plan sumittal in order to facilitate the approval process.

[2] The estimate of job hours are based on the assumption that the Sampling and Analysis Plan for both OUs will be combined in a single deliverable. Estimate includes review time, and allocates time for team communication

[3] In addition to a field visit, this cost estimate assume that the DTSC Geologist and Project Manager may be involved with discussions regarding field data and step out sampling

[4] As with the other subtasks in this category, the assumption is that the report for both OUs will be presented under simultaneously. This category also includes time for meetings, conference calls and other communication that will be needed in order to facilitate the movement of the project

[5] Assumes CEQA compliance addressed via EIR. Estimate not provided at this time

[6] The need for this task is contingent upon the results of the Site Characterization Report, and the job hour estimate is based on the data presented in the VCA application

EXHIBIT D

COST ESTIMATE WORKSHEET

VOLUNTARY CLEANUP AGREEMENT

Project Name: Long Beach Memorial Medical Center: Exisiting Facility (OU3)

Title	VCP Coord.	Project Manager		Supervisor		Toxicology	Geology	Industrial Hygiene	HQ Engring	Public Particip	HQ CEQA	Legal	Clerical
Classification	Sr. HSS	HSS	HSE	HSSI	HSEI	Staff Toxicologist	Eng Geol.	Assoc IH	HSE	PPS	AEP	Staff Counsel	WPT
TASK: Agreement Prep./Negotiation													
Scoping Documents: HSP/SAP/QAP													
Review and comment on existing data and Preliminary Endangerment Assessment (PEA) equivalent documents and provide general project oversight[1].		8		4		8	8						2
Site Characterization													
- Workplan		24		4		8	24						2
- Implementation		4		2			8						
- Report		32		8			24						2
Risk Assessment		16				40							
Public Participation		4								24			
CEQA[2]													
Removal Action Workplan[3]		32		12		16	16			8			
Implement Removal Action		12					4						
Design													
Remedial Action Plan (RAP)													
Certification		12		2									
Deed Restriction		16		2								16	
Operation & Maint[5]													
Total No. Hours/Class	160	0	34	0	72	84	0	0	32	0	0	6	
Hourly Rate/Class	111	123	128	135	150	123	116	123	104	109	153	52	
Cost/Class	17760	0	4352	0	10800	10332	0	0	3328	0	0	312	
Grand Total Cost	$46,884												

14-Feb-05

Cost Assumptions:

1 Much of the background information for this site would have been evaluated in conjucntion with activities conducted at OU1 and OU2

2 Assumes CEQA compliance addressed via EIR. Estimate not provided at this time

3 The need for this task is contingent upon the results of the Site Characterization Report.

Exhibit E

TASK	Timeline
Agreement to Execution	February 2005
Proponent to Submit Advance Payment	10 Days After Agreement Execution
Proponent to Submit Site Characterization Work Plan/Quality Assurance Plan for OU 1 and OU 2	14 Days After Agreement
DTSC To Review and Comment on Site Characterization Work Plan/Quality Assurance Plan	Within 30 days of Receipt of Site Characterization Work Plan/Quality Assurance Plan
Proponent to Prepare and Submit Site Characterization Report for OU 1 and OU 2	Within 30 days of Completion of Field Activities
DTSC To Review and Comment on Site Characterization Report	Within 30 days of Receipt of Site Characterization Report
Proponent to Prepare and Submit Draft RAW for OU 1 and OU 2	Concurrently with Site Characterization Report
DTSC to Review and Comment on Draft RAW	Within 30 days of Receipt of RAW
Public Participation Activities for OU 1 and OU 2	Concurrently, as Determined by Project Needs
Proponent to Finalize RAW and incorporate DTSC and Public Comments	Within 15 days of close of comment period
DTSC to Approve Final RAW	Within 15 days of Receipt of Final RAW
Proponent to Implement RAW for OU 1 and OU 2	As outlined in RAW
Proponent to Submit Implementation Report	As outlined in RAW

Appendix M

Traffic Analysis Cover

The City of Long Beach Department of Public Works traffic engineer reviewed Linscott, Law & Greenspan Engineers' Traffic Impact Analysis and determined that it was complete and adequate. The cover for the report has been revised to reflect this determination.

LINSCOTT LAW & GREENSPAN
engineers

DRAFT TRAFFIC IMPACT ANALYSIS

LONG BEACH MEMORIAL MEDICAL CENTER EXPANSION

Long Beach, California
December 17, 2004

Prepared for:

Sapphos Environmental, Inc.
133 Martin Alley
Pasadena, California 91105

And

The City of Long Beach
Department of Community Development
333 West Ocean Boulevard
Long Beach, California 90802

LLG Ref. 2.04.2573.1

REGISTERED PROFESSIONAL ENGINEER
DANIEL A. KLOOS
No. 2200
Exp. 9-30-05
TRAFFIC
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
RICHARD E. BARRETTO
No. 2006
Exp. 6-30-07
TRAFFIC
STATE OF CALIFORNIA

Prepared by:
Daniel A. Kloos, P.E.
Transportation Engineer II

Under the Supervision of:
Richard E. Barretto, P.E.
Principal

Linscott, Law & Greenspan, Engineers
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Suite 122
Costa Mesa, CA 92626
714.641.1587 T
714.641.0139 F
www.llgengineers.com

Appendix N

Résumés

Appendix N

Kleinfelder, Inc.
Résumés

SCOTT DWYER
Senior Toxicologist

Summary of Experience

Dr. Dwyer specializes in the application of toxicology and risk analysis techniques to human health risk assessment, facility siting, and risk of catastrophic events, including chemical releases, pipeline failures, and terrorist attacks. He has served as the project/task manager on many risk assessments performed under CERCLA, RCRA, and state guidelines across the country. Dr. Dwyer has conducted numerous human health screening evaluations in accordance with Department of Toxic Substances Control (DTSC) guidance for proposed new school sites in California. Dr. Dwyer has also provided expert testimony and litigation support on behalf of the U.S. Department of Justice and private clients. He participated in the development of the Interim TPH Policy for the State of Washington and in the development of risk assessment guidelines that are being applied to railroad facilities in Mexico.

Dr. Dwyer has been the senior author or co-author of more than 100 client-funded risk assessment and toxicology reports. This work has encompassed baseline human health risk assessments in several states, including California, Oregon, Washington, Idaho, Montana, Utah, Nevada, Arizona, Alaska, Mississippi, and South Carolina. These risk assessments included evaluations of risk associated with chemicals released to air, soil, and surface and ground water.

Education

BA, History, Washington State University at Pullman, Washington, 1982
BS, General Studies/Biological Sciences, Washington State University at Pullman, Washington, 1983
MS, Pharmacology/Toxicology, Washington State University at Pullman, Washington, 1985
PhD, Pharmacology, University of Alabama System : Birmingham, Alabama, 1989

Registrations

Diplomat of the American Board of Toxicology (D.A.B.T.), NAT, 1997

Professional Affiliations

Society for Risk Analysis

Select Project Experience

The following is a representative selection of Scott Dwyer's project experience.

Health Risk Assessment

Human Health and Ecological Risk Assessments for Six Installation Restoration Program (IRP) Sites, Space and Naval Warfare Systems Center (SPAWAR), Point Loma Naval Complex, San Diego, California. Dr. Dwyer is the task manager and technical lead for the development of six human health and ecological risk assessments being performed at the SPAWAR facility on Point Loma in San Diego, California. The six sites have supported various naval operations including a plating and sandblasting shop, re-fueling, and sewage disposal. The contaminants of concern include metals (e.g., arsenic, beryllium, cadmium), volatile organic compounds, pesticides, PCBs, and PAHs. The primary exposure pathways of concern include soil ingestion, inhalation of soil particulates, and direct dermal contact for humans and other animals, as well as uptake of contaminants by plants. The project team is also evaluating the potential for leaching of contaminants to groundwater and transport to the Pacific Ocean located within 0.25 miles of each of the sites. The risk assessment reports are now under review at the State of California Department of Toxic Substances Control.

Risk Assessment, Cement Plant (Confidential Client), Trident, Montana. Dr. Dwyer developed a risk assessment of exposure to potential TDF emissions by pathways including inhalation, dermal contact, water ingestion, soil ingestion, ingestion of locally-produced beef, poultry, pork, eggs, milk, and grains, as well as ingestion of mother's milk by nursing infants.

Dr. Dwyer also performed a screening level ecological risk assessment although such a study is not specifically required under Montana environmental law. The risk assessment is the key piece of what MDEQ is calling the "air permit of the decade" because of the breadth of exposure pathways evaluated, the high level of public concern, and the efforts to block permit approval. A draft permit was approved in March 2003. The TDF project is now undergoing an environmental impact statement. Dr. Dwyer has been a key participant in several meetings with MDEQ during the scoping and review of the risk assessment and has made presentations describing this work at public meetings.

Human Health Risk Assessment, Blackman-Uhler Chemical Company, Spartanburg, South Carolina. Blackman-Uhler Chemical Company, Spartanburg, South Carolina. Dr. Dwyer prepared the human health risk assessment for the RCRA Corrective Measures Study (CMS) completed for the Blackman-Uhler Chemical Company plant in Spartanburg, South Carolina. The risk assessment involved the evaluation of nine Solid Waste Management Units (SWMUs) and SWMU groups generated as a result of aniline dye production at the subject plant, as well as on-site groundwater, and nearby surface waters.

The key health risk issues at the plant site included ingestion of and dermal contact with affected soil, and inhalation of dust by plant employees and subsurface utility workers. Groundwater was not a domestic supply and did not migrate to or commingle with a domestic supply; however, leachability of soil contaminants to groundwater was addressed in the risk assessment.

Based on the risk assessment, target soil cleanup goals for the protection of groundwater were developed. The risk assessment was prepared to meet the standards of the South Carolina Department of Health and Environmental Control (DHEC) and Region IV of the U.S. EPA. The RCRA CMS was submitted to DHEC and EPA and formed the basis of the first Corrective Action Management Unit (CAMU) permit approval in the State of South Carolina.

Human Health Risk Assessment, Tooele Army Depot, U.S. Army Corps of Engineers, Tooele, Utah. Dr. Dwyer performed a baseline human health risk assessment for the Tooele Army Depot (TEAD) to support the optimization of the on-going groundwater treatment system and to support the implementation of an alternative cleanup level for trichloroethene (TCE), which was present in the groundwater at concentrations that exceed the Maximum Contaminant Level (MCL) at some monitoring well locations.

TCE and chloroform were the primary chemicals of concern. For these and a handful of other VOCs, three human health exposure scenarios based on various subsets of monitoring well data were evaluated. Two of the scenarios were focused on residential exposures, including water ingestion, dermal absorption, and inhalation of vapors during bathing. The third scenario was focused on an industrial exposure scenario and included an evaluation of water ingestion and dermal contact.

The results of the risk assessment and the toxicological information available for TCE supported the conclusion that an alternative cleanup level significantly greater than the MCL of 5 ug/L was appropriate and health-protective. The risk assessment also supported recommendations for treatment system modifications that would save the Army Corps of Engineers approximately $20 million in operating costs over the life of the remediation effort.

Human Health Risk Assessment, Nevada Power, Moapa, Nevada. Dr. Dwyer was the task manager for the development of a human health risk assessment of soil and groundwater contamination observed at the Reid Gardner Station (RGS) operated by Nevada Power in Moapa, Nevada. RGS is approximately 45 miles northeast of Las Vegas and is comprised of four coal-fueled electric generating units. The risk assessment was based on several rounds of Phase II investigation data. The primary chemicals of concern included arsenic, chromium, lead, vinyl chloride and other chlorinated hydrocarbons, and PCBs. Exposures to soil and groundwater were evaluated for a worker exposure scenario. The purpose of the risk assessment was to provide a sound technical basis for recommending additional investigation, remediation, or no-further-action. Based on Dr. Dwyer's evaluation, soil at RGS did not require further investigation or remediation; however, additional monitoring was recommended for groundwater.

Human Health Risk Assessment, Former Pepsi Distribution Plant, Ogden, Utah. Dr. Dwyer performed a human health risk assessment for parties responsible for a plume of PCE, TCE, and other chlorinated solvents that originated from a former distribution plant and had migrated under an adjacent residential area. The specific goals of the risk assessment were to support a request to discontinue groundwater monitoring and to demonstrate that the groundwater plume would not reach surface water. Domestic use of groundwater was eliminated as an exposure pathway of concern based on a well survey that showed no existing domestic supply wells in the study area. The Johnson and

Ettinger model for subsurface vapor transport was used to estimate indoor air concentrations of the chemicals of concern and to estimate cancer risk and noncancer hazard. A survey of the design of the homes in the area was performed to identify those constructed with basements and those with slab-on-grade foundations. Because approximately half of the homes had basements, the vapor migration model was set up to evaluate homes with basements.

The results of the risk assessment demonstrated that groundwater concentrations of PCE, TCE, and the other chlorinated solvents had declined over time and that vapor migration to indoor air did not yield a cancer risk exceeding 1 x 10-6 or a noncancer hazard of 1.0. The responsible parties proposed, and the Utah Department of Environmental Quality agreed, that groundwater monitoring could be discontinued, saving the client thousands of dollars in annual groundwater monitoring costs.

Human Health Screening Evaluation, Midland Elementary School, Poway Unified School District, Poway, California. Dr. Dwyer performed a human health screening evaluation of chemicals detected in soil samples collected from the Midland Elementary School campus. The school district plans to demolish the existing school and construct a new elementary school on the same site. The chemicals of potential concern included termiticides (chlordane and dieldrin) injected into the soil around and under the school building possibly as long ago as the 1960s. Due to the persistent nature of these chemicals, significant quantities remain in subsurface soil. After completion of the health screening evaluation, Dr. Dwyer participated in two public meetings to discuss the results and answer questions posed by school faculty, staff, and the parents of children attending the school. Based on the results of the screening evaluation, Dr. Dwyer recommended the excavation and off-site disposal of soils containing chlordane and dieldrin. The human health screening evaluation was performed in accordance with California Department of Toxic Substances Control (DTSC) Preliminary Endangerment Assessment (PEA) guidance.

Tier II RBCA Health Risk Evaluation, CalTrans Coalinga Maintenance Station, Coalinga, California. Dr. Dwyer performed a Tier 2 Risk Based Corrective Action (RBCA) health risk evaluation for soil affected by petroleum hydrocarbon releases at the Caltrans Coalinga Maintenance Station in Coalinga, California. The purpose of the risk evaluation was to provide information to support a no-further-action designation for the hydrocarbon releases based on the low level of hazard that hydrocarbons pose to human health. Estimates of cancer risk and noncancer hazard were developed based on site-specific information collected during site investigations and on default exposure assumptions provided by EPA and the State of California. The maximum soil and soil gas concentrations of the chemicals of concern were used to represent an upper bound exposure scenario. The chemicals of concern included petroleum hydrocarbons (observed as gasoline, diesel, or motor oil), organochlorine pesticides (DDE and DDT), volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs). Based on the results of the risk assessment, Dr. Dwyer concluded that the site should receive a no-further-action designation for soil affected by the chemicals of concern.

Vapor Migration Modeling and Human Health Risk Assessment, South Shore Shopping Center, Alameda, California. Dr. Dwyer performed a human health risk assessment of indoor air concentrations of chemicals in two retail dry cleaning operations at the South Shore Shopping Center in Alameda, California. The chemicals of concern (primarily tetrachloroethene) may have been present in the indoor air due to the use and storage of dry cleaning materials during normal operations or due to subsurface releases of these chemicals that later migrated as vapors from soil or groundwater to indoor air. Health hazards were evaluated under current and future occupational exposure conditions based on OSHA and NIOSH exposure limits, and based on California Office of Environmental Health Hazards Assessment (OEHHA) "No Significant Risk Levels." Vapor migration modeling was performed using the EPA and DTSC approved Johnson and Ettinger model. The objective of the vapor migration modeling and risk assessment was to support future land use evaluations by the property owner and to evaluate worker safety under current conditions.

Vapor Migration Modeling and Human Health Risk Assessment, Hawthorne Gateway Center, Hawthorne, California. Dr. Dwyer assessed the human health risk that may be associated with organic vapors migrating from subsurface soil to the indoor air of an hypothetical commercial/retail structure located at the proposed Gateway Center development in Hawthorne, California. Four soil gas surveys were conducted on the site and the results of these surveys were used to model the potential organic vapor migration. Specifically, the maximum soil gas concentration of each organic chemical detected was used in an EPA vapor migration model to estimate the indoor air concentration. Then, the estimated indoor air concentration of each chemical was used to estimate the cancer risk or noncancer hazard that may be associated with inhalation of the chemicals of concern under a commercial land use scenario.

Risk Assessment of Proposed School Expansion Site, Anaheim City School District, Anaheim, California Dr. Dwyer was the technical director for the risk assessment of a proposed school expansion site located in Anaheim, California. The school district planned to re-develop a vacant lot near an existing school for additional classroom space and a playfield. The district identified three concerns with the use of this property by students:

· A petroleum product transport pipeline that passed through the site 20 feet below ground surface;
· The presence of a nearby oil company fuel storage and distribution facility; and
· A culvert and outfall through which petroleum products could travel if an accidental release occurred from the oil company facility.

Kleinfelder's risk assessment approach focussed on six key areas:

· Engineering design of the pipeline and above ground storage tanks, including seismic vulnerability;
· Safety and release-prevention measures implemented for the pipeline and tank farm;

· Air emissions from the oil company tank farm;
· The environmental fate and transport and the toxicity of the petroleum products transported through the pipeline or stored at oil company;
· The likelihood that exposure of students will occur at a level that could result in adverse health effects; and
· The ability of facility-based or local hazardous materials emergency response teams (hazmat teams) to mitigate releases, prevent exposures, and restore site conditions.

Kleinfelder's work was executed on a tight schedule given the district's demanding construction schedule: the growth in the local student population required the rapid construction of more classroom space. Kleinfelder's work resulted in a risk assessment report used to support a determination of non-significance and contributed to the timely implementation of the construction schedule. The work was completed on time and under budget.

Water Pipeline Risk Analysis, Moreno Valley, California, Val Verde Unified School District The Val Verde Unified School District retained Kleinfelder to prepare a water pipeline risk analysis for a proposed new school site in Moreno Valley, California. The State of California Department of Water Resources (DWR) operates the Santa Ana water pipeline, a 10-foot diameter prestressed concrete pipeline that passes immediately adjacent to north and east boundaries of the proposed school site. Because the pipeline passes within 1,500 feet of the proposed school site, the California Code of Regulations stipulates that a risk analysis study must be performed. The risk analysis was designed to assess the likelihood that the integrity of the pipeline could be compromised in a location, and to a degree, that poses an unacceptable hazard to the students, faculty, and staff of the proposed school.

This risk analysis was based on the following information:
· pipeline alignment,
· use characteristics (flow rate and frequency of use),
· engineering design and safety features,
· records of past incidents,
· failures in similar systems (frequency, magnitude, consequences), and
· risk management and emergency response plans of the pipeline owner, local emergency response agencies, and the school district.

Kleinfelder concluded that, based on available information, the likelihood that the pipeline would fail at the location of the school site was low. Kleinfelder provided recommendations to the school district designed to limit the consequences of a pipeline failure. Kleinfelder's risk analysis report is under review at the California Board of Education.

Natural Gas Pipeline Risk Analysis, Liberty Unified High School District, Brentwood, California The Liberty Unified High School District retained Kleinfelder to prepare a natural gas pipeline risk analysis for the proposed site of a new high school. The

California Code of Regulations stipulates that a risk analysis study must be performed before a site can be approved for a new school. The purpose of the risk analysis was to assess the likelihood that the integrity of the pipeline could be compromised in a location, and to a degree, that poses an unacceptable hazard to the students, faculty, and staff of the proposed school. Dr. Dwyer prepared the risk analysis according to the California Department of Education (CDE) guidance, which includes a probability and consequence analysis of leak fires, jet fires, and vapor cloud explosions. Two pipelines were located within 1,500 feet of the proposed school site: one operated by CalPine and the other operated by PG&E. On the basis of the risk analysis, Dr. Dwyer made recommendations about the placement of structures on the high school site and landscape modifications that would reduce the impact of a pipeline explosion. The report has been submitted to the CDE for site approval.

Shaver's Farm Landfill, Walker County, Georgia. Dr. Dwyer provided expert testimony regarding the human health and ecological impacts of dioxin and the pesticides dicamba and benzonitrile. In his deposition, Dr. Dwyer reviewed the environmental fate and transport, potential exposure pathways, and toxicology of the chemicals of concern. The deposition also included an assessment of the likelihood that humans, other animals, or plants would be adversely affected by release of the landfill contents to the environment.

WSU Research Station, Long Beach, Washington. Dr. Dwyer provided toxicology and risk assessment support in negotiations with the Washington Department of Ecology regarding the appropriate sampling program for a pesticides released to soil at an agricultural research station. The chemicals of concern included the pesticides dieldrin and DDT. Based on the toxicity and the environmental fate and transport of the chemicals of concern a limited soil sampling program was developed to cost-effectively allocate site investigation resources.

Tuttle Rhododendron Farm, Whidbey Island, Washington. Several pesticides, including DDT, atrazine, dieldrin, and dichlobenil had been used historically at a rhododendron farm. Dr. Dwyer developed soil cleanup levels for the chemicals of concern to protect human health and to provide reasonable goals for remediation at the site. This work included the development of an oral reference dose (RfD) for dichlobenil which was not previously available but which forms the basis of the soil cleanup level. An RfD is the dose of a chemical that is not expected to cause adverse health effects in humans.

Baseline Risk Assessment for Rocker Timber Framing and Treatment Plant Site. Prepared a baseline risk assessment for a small timber treatment site within the Silver Bow Creek/Butte Addition Superfund Site. The site had been impacted by fluvially deposited mine, mill, and smelter wastes, residual contamination from operation of the wood treatment plant, and use of arsenical pesticides on the railroad right-of-way that passed through the site. Dr. Dwyer conducted a sample-specific risk assessment to focus attention on those portions of the site that yielded the most significant human health risk.

Preparation of Human Health Risk Assessment Reports for Three Mississippi Air National Guard Bases, Jackson, Meridian, and Gulfport, MS. As part of the Installation

Restoration Program (IRP), Dr. Dwyer prepared human health risk assessments for three Air National Guard bases in Mississippi. Petroleum hydrocarbons and pesticides were the primary contaminants of concern in soil, groundwater, and surface water. Dr. Dwyer participated in selecting groundwater monitoring sites to optimally investigate the potential for contamination of nearby domestic water supply wells. He also managed all aspects of the preparation of the risk assessments, including data evaluation, identification of contaminants of concern, exposure and toxicity assessment, and risk characterization. The three reports were completed on time and under budget.

Mica Landfill, Mica, Washington. Dr. Dwyer prepared one of the first landfill risk assessments conducted under the Model Toxics Control Act. The municipal landfill in Mica had received household and municipal solid waste and the primary chemicals of concern included metals (such as arsenic, cadmium, chromium, copper, and manganese), chlorinated solvents (including perchloroethylene and trichloroethene), and phthalate esters (including bis-2-ethylhexyl phthalate). The potential public health hazards associated with landfill leachate impacts to area groundwater and surface water (particularly Chester Creek) were the focus of the risk assessment. On the basis of the risk assessment, exposure to groundwater and surface water did not appear to pose an unacceptable public health hazard.

Centralia Landfill, Centralia, Washington. As part of a remedial investigation/ feasibility study at the Centralia Landfill, Dr. Dwyer developed preliminary remediation goals (PRGs) for the chemicals of concern in landfill leachate. A conceptual site model was prepared to evaluate the potential exposure pathways associated with the landfill and the chemical-specific PRGs were developed for each of those pathways. The PRGs were used to determine appropriate quantification limits for the soil and groundwater sampling program and for theevaluation of various remedial technologies.

Seattle Water Department, Mountain Tree Farm Property, North Bend, Washington. Dr. Dwyer and the Kleinfelder project team developed a risk-based approach to the remediation of petroleum-contaminated soil at the Mountain Tree Farm Property. The site was formerly used as a logging operations facility which provided lodging for workers, logging truck and equipment maintenance, fuel storage and dispensing, and a railroad siding for transferring logs from trucks to railroad flatcars. The Water Department plans to redevelop the property as the trailhead for the Iron Horse Trail System. The risk-based approach incorporated the newest methodologies for assessing and managing petroleum-contaminated soils, including the ASTM Risk-Based Corrective Action (RBCA) standard, and Ecology's Interim TPH Policy, which is under development. The Kleinfelder approach involved segregating excavated soil according to risk-based petroleum hydrocarbon concentrations. Segregation of the soil resulted in a more efficient and cost-effective remediation of only the soils that posed an unacceptable level of health hazard. Soil considered clean from a health risk perspective was used to backfill the site excavations.

Petroleum Users Group (PUG), Port of Anchorage, Alaska. Dr. Dwyer prepared the human health risk assessment for the PUG area of the Port of Anchorage (POA). The purpose of the risk assessment was to support the development of alternative cleanup level goals for remediation of the PUG-POA area. Gasoline, diesel, jet fuels, lubricants, and the BTEX compounds are the primary contaminants of concern. This site is one of the major petroleum storage and distribution facilities in the state and is located on a deep water channel, Knik Arm, of Cook Inlet. The PUG is a consortium of bulk fuel refiners and suppliers, including MAPCO Alaska Petroleum, Texaco, Chevron, Tesoro, Defense Fuels, and Signature Fuels. The PUG-POA area covers approximately 600 acres and contains more than 100 above ground petroleum storage tanks and miles of associated pipeline. The port is equipped to load and off-load semi tanker trucks, railroad tank cars, and ocean-going oil tankers.

Truax Harris Energy, Madison Avenue Property, Portland, Oregon. Dr. Dwyer applied the new ASTM RBCA Standard and the Oregon Department of Environmental Quality (DEQ) RBCA methodology to evaluate residual petroleum contamination at a former gas station site in downtown Portland. The site owners planned to redevelop the site with condominiums. The potential exposure pathways that were evaluated included volatilization of hydrocarbons from subsurface soil to ambient outdoor air. Based on architectural drawings for the condominiums, volatilization to indoor air was not evaluated because the first floor of the planned development was to be an open air carport. Soil excavation on the site was directed by soil analysis and comparison of analytical results to Tier 1 RBCA risk-based screening levels (RBSLs), which Dr. Dwyer developed. The cost of remediation was, therefore, limited to management of soil that posed an unacceptable health hazard. The site is currently under consideration by DEQ for closure based on the RBCA evaluation.

Wall Street Properties, South San Francisco and San Mateo, California. Dr. Dwyer prepared risk-based corrective action evaluations according to the ASTM RBCA Standard for three automotive repair and fuel dispensing operations in the Bay Area. Subsurface soil and groundwater at the three sites contained residual petroleum hydrocarbons resulting from normal site operations. Dr. Dwyer evaluated four potential exposure pathways at each site, including volatilization of hydrocarbons from subsurface soil and groundwater to outdoor and indoor air. Based on Dr. Dwyer'sevaluation, the residual hydrocarbon contamination did not pose an unacceptable level of health hazard and additional remedial actions were not considered to be warranted. The sites are now under consideration by the San Mateo County Health Department for closure based on the RBCA evaluation.

Risk Assessment and Development of Alternative Cleanup Levels at a Former Bulk Fuel Storage Facility, Olympia, WA. Served as the project manager for a risk assessment and focused feasibility study for a former bulk fuel storage site contaminated with diesel, gasoline, and heavy oil. The site was located on Budd Inlet next to a City of Olympia park. The city wanted to expand the park onto the contaminated site. The risk assessment was used to support an alternative soil cleanup level of 3,000 ppm for petroleum hydrocarbons and a "substantial and disproportionate" analysis under MTCA, which limited the cleanup costs to a level reasonable for the site owner.

Development of Alternative Soil Cleanup Levels for Petroleum Hydrocarbons, Chevron-Vancouver Bulk Oil Products Plant, Vancouver, WA. Total petroleum hydrocarbon (TPH) concentrations in the soils of a bulk fuel plant, formerly owned by Chevron-U.S.A., exceeded the cleanup levels for gasoline, diesel, and other petroleum products under the Model Toxics Control Act (MTCA) Method A. Remediation of the soil to Method A cleanup levels was not economically practicable particularly since the major contamination was associated with fairly well-defined hot spots. Under the assumption that certain components of the TPH mixtures contributed most of the risk of adverse health effects, Dr. Dwyer used the conservative MTCA exposure factors to develop risk-based alternative soil cleanup levels. The resulting soil cleanup levels, if implemented with capping of portions of the site, will effectively prevent human exposure and protect the groundwater for a fraction of the cost of cleanup to Method A levels.

Risk Assessment to Support Rescinding a Waste Discharge Requirement Order. Prepared a risk assessment of petroleum and solvent contaminated soil and ground water for a Fortune 500 company in Silicon Valley. The innovative approach to the risk assessment was instrumental in supporting the decision of the California Regional Water Quality Control Board to rescind a waste discharge monitoring order which required, in part, quarterly ground water monitoring. The decision to rescind this order was the first of its kind in the State of California and will save the client more than $70,000 per year.

Development of Preliminary Remediation Goals and Toxicological Profiles of Contaminants of Concern, Texaco-Fillmore Plant, Ventura, CA. The soils and surface water of a former site of a Texaco plant were contaminated with petroleum hydrocarbons, polynuclear aromatic hydrocarbons, and metals. Little toxicological information was available for several of the TPH and PAH compounds. Dr. Dwyer prepared toxicological profiles for these chemicals based on similarities in chemical structure to other well-studied compounds. The remedial investigation also required the development of data quality objectives to satisfy the requirementsof a comprehensive baseline risk assessment. Dr. Dwyer prepared risk-based preliminary remediation goals for the contaminants of potential concern to support development of the data quality objectives.

Underground Storage Tank Management Program, Aerospace Manufacturer, Renton, WA. Served as the task manager for the human health risk evaluation portion of an underground storage tank management program for a major aerospace manufacturer. The program incorporated a computer ranking system for evaluating underground petroleum product storage tanks and directing the disposition of those tanks. Remediation of each tank location was based on a computerized ranking system that incorporated human health risks.

Human Health Risk Assessment Project for Eight DEW Line Installations. Under the Installation Restoration Program of the U.S. Air Force, prepared human health risk assessments for eight radar installations on the North Slope of Alaska. These installations were part of the Distant Early Warning (DEW) line of defense constructed in the 1950s. During operation of the radar installations, contamination of soil, sediments, groundwater, and surface water occurred. The primary contaminants of concern were diesel and gasoline. Other contaminants that were evaluated included chlorinated solvents and PCBs. The risk assessment of the DEW Line installations provided a unique challenge because of the largely subsistence lifestyle of the Inupiat Eskimos inhabiting the North Slope, a primary receptor group of concern. As part of the risk assessment, performed a thorough investigation of subsistence lifestyle patterns drawing from both published and oral resources to develop a reasonable model of exposure for the residents of the North Slope.

Development of a Tier II Analysis for the METRO-West Point Sewage Treatment Plant, Secondary Clarifiers, Seattle, WA. Completion of the $500 million METRO-West Point Sewage Treatment Plant depended in part on procurement of a Notice of Construction for the secondary clarifiers. This required the comparison of chemical emission levels to new standards set in Washington State air toxics legislation. Chloroform emissions from the secondary clarifiers were predicted to exceed the new standard based on air dispersion modeling. In this situation, the air toxics legislation provided the opportunity to develop a risk assessment to support raising the emission standard. Dr. Dwyer prepared a risk assessment (called a Tier II analysis) for the chloroform emissions that indicated exposure to the modeled concentrations posed an acceptable health risk for all segments of the population. After careful review of the risk assessment by the Departments of Ecology and Health, the Notice of Construction was approved. This approval was the first granted by Ecology on the basis of a Tier II analysis.

Class II Permit Modification for RCRA Compliance Monitoring, Envirosafe Services of Idaho, Inc. (ESII), Grandview, ID. Developed alternate concentration limits for groundwater monitoring of chlorinated solvents as part of a Class II permit modification under RCRA. The solvents were leaking from underground storage tanks that were formerly Titan missile silos. After negotiations with the Idaho Department of Health and Welfare, the alternate concentration limits and the rationale applied to their development were determined to be sufficient to support the permit modification. The permit modification will significantly reduce the cost of RCRA compliance for the client.

Development of Appropriate Detection Limits for Ambient Air Monitoring, Hill Air Force Base, Utah. Hill AFB operates a thermal treatment unit (TTU) for the destruction of missile and rocket motors. Hydrogen chloride (HCl) and chlorine (Cl) emissions from the TTU have been implicated in the development of adverse health effects reported by people who live and work in the area. To evaluate the potential for adverse health effects caused by TTU emissions, Hill AFB proposed to monitor ambient air concentrations of HCl and Cl and to perform a risk assessment based on the results of the monitoring program and air dispersion modeling. Selection of the monitoring equipment required knowledge of reasonable detection limits for HCl and Cl. Dr. Dwyer developed risk-based detection limits for these two chemicals based on the toxicology literature regarding exposure of humans and other animals. These detection limits were the deciding factor in the selection of air monitoring equipment costing thousands of dollars.

Toxicology

Preparation of Toxicological Profiles for the Agency for Toxic Substances and Disease Registry (ATSDR) . Principal author of toxicological profiles for 1,3-dichloropropene and 2-butanone. Development of these profiles required a thorough analysis of the toxicology literature regarding the toxicity and toxicokinetics of these compounds in humans and other animals. Where the toxicity information was sufficient and appropriate, "minimal risk levels" (MRLs) were calculated using a methodology similar to the U.S. EPA reference dose methodology.

Preparation of Health and Environmental Effects Documents (HEEDs) for the U.S. Environmental Protection Agency. Principal author of the HEEDs for formaldehyde, hydrazine, 1,1-dimethylhydrazine, 1,1-biphenyl, and 2,4,6-trinitrophenol. Preparation of the HEEDs involved a comprehensive analysis of the toxicology and toxicokinetics of these compounds. For compounds with sufficient and appropriate information, reportable quantities (RQs), reference doses (RfDs), and slope factors were developed.

Consortium for Environmental Risk Evaluation (CERE) . Member of the health risk evaluation team assigned to the Hanford reservation under the CERE project funded by the Department of Energy (DOE). This project involved reviewing all of the health risk assessment information available for the Hanford site to determine the adequacy of this information for estimating public health risk, to identify risk priorities, and to identify sites that may pose substantial risk but that have not yet been addressed. The project resulted in a site characterization report that will be used for a presentation DOE must make before Congress.

Software and Database Development

Simulated Exposure Assessment Model (SIMEXAS) . Dr. Dwyer was a principal author and task manager for the development of a probabilistic exposure assessment model (SIMEXAS) that incorporated a Monte Carlo module to develop estimates of exposure point concentrations. SIMEXAS was used by an electric power industry group to successfully challenge new soil cleanup levels proposed by a state on the East coast. A publication based on this application of SIMEXAS was a finalist for the Risk Assessment award at the 1993 annual meeting of the Societyof Toxicology.

The Electronic Handbook of Risk Assessment Values (EHRAV) . Dr. Dwyer conceived, developed, and now publishes the EHRAV database electronically. EHRAV is a compendium of risk assessment values (e.g., reference doses, slope factors, health advisories) that are key to preparing human health risk assessments. EHRAV has been updated monthly since 1992.

HyperText-IRIS. Dr. Dwyer has developed a hypertext version of the U.S. EPA Integrated Risk Information System (IRIS) for the PC. HyperText-IRIS (HTI) allows rapid access to the toxicological information contained in IRIS using natural language (plain English) queries. HTI incorporates a powerful search engine that allows the user to retrieve, for example, "all of the non-cancer reference doses based on 2-year feeding studies in rats but not mice, monkeys, or guinea pigs." In addition, more than 20,000 hypertext links are embedded in this electronic document which allow the user to rapidly "jump" between related pieces of information. HTI was released in January 1995 and is updated monthly.

Publications and Papers

Co-author, *"Probabilistic Health Risk Analysis of Proposed PCB Soil Cleanup Standards"* , The Toxicologist , Dwyer, S, S. Richards, D. Lincoln, and A. Silvers, (Abstract), 13:275, 1993.

Co-author, *"Probabilistic Exposure Assessment Using a Monte Carlo-Based Model"* , The Toxicologist , Dwyer, S, D. Lincoln and A. Silvers, (Abstract), 12:98, 1992.

Co-author, *"Calcium Mobilization by Cadmium or Decreasing Extracellular Na+ or pH in Coronary Endothelial Cells"*, Exp. Cell Res. , Dwyer, S, Y. Zhuang and J.B. Smith, 192:22-31, 1991.

Co-author, *"Toxicological Profile for 1,3-Dichloropropene,"* , Prepared for the Agency for Toxic Substances and Disease Registry, Dwyer, S, E. Michaelenko, U.S. Public Health Service, Atlanta, Georgia, 1990.

Co-author, *"Health and Environmental Effects Document on Formaldehyde"* , Prepared for the Environmental Criteria and Assessment Office, Dwyer, S, W. Meylan and S. Coleman, U.S. Environmental Protection Agency, Cincinnati, Ohio, 1990.

Co-author, *"Health and Environmental Effects Document on Hydrazine"* , Prepared for the Environmental Criteria and Assessment Office, Dwyer, S, D. Basu and S. Coleman, U.S. Environmental Protection Agency, Cincinnati, Ohio, 1990.

Co-author, *"Toxicological Profile for 2-Butanone (Methyl ethyl ketone)"* , Prepared for the Agency for Toxic Substances and Disease Registry, Dwyer, S, J. Tunkel, U.S. Public Health Service, Atlanta, Georgia, 1989.

Co-author, *"Decreasing Extracellular Na+ concentration Triggers Inositol Polyphosphate Production and Ca2+ Mobilization"*, J. Biol. Chem. , Dwyer, S, J.B. Smith and L. Smith, 264:831-837, 1989.

Co-author, *"Cadmium Evokes Inositol Polyphosphate Formation and Calcium Mobilization: Evidence for a Cell Surface Receptor that Cadmium Stimulates and Zinc Antagonizes"*, J. Biol. Chem. , Dwyer, S, J.B. Smith and L. Smith, 264:7115-7118, 1989.

Co-author, *"Lowering Extracellular pH Triggers Inositol Lipid Hydrolysis and Calcium Mobilization"*, J. Biol. Chem. , Dwyer, S, J.B. Smith and L. Smith, 264:8723-8728, 1989.

Co-author, *"Rat Platelet Aggregation: Strain and Stock Variations"*, Thromb. Res., Dwyer, S, K.M. Meyers, 42:49-56, 1986.

Co-author, *"Anesthetics and Anticoagulants Used in the Preparation of Rat Platelet-Rich-Plasma Alter Rat Platelet Aggregation"*, Thromb. Res. , Dwyer, S, K.M. Meyers, 42:139-149, 1986.

Awards

American Society of Pharmacology and Experimental Therapeutics Travel Grant, 1987.

Graduate Research Fellowship, School of Joint Health Sciences, University of Alabama, 1985.

GEORGE E. JOHNSON
Project Environmental Engineer

Summary of Experience
Mr. Johnson has over 14 years of engineering experience in environmental consulting, managing Phase II site assessments, designing, specifying and managing the installation and operation of remediation systems. His experience includes project management and field task implementation. His project management responsibilities have included client relations, project planning, cost control, and select/supervise subcontractors.
Mr. Johnson currently manages the design, installation, and operation of soil and groundwater remediation systems in addition to reporting and project management for environmental site assessments.

From 1978 to 1983, Mr. Johnson worked as a marine electrician at Todd Shipyard in Seattle, Washington. He trained through the apprenticeship program and obtained Journeyman status. He installed a variety of ship component electrical systems on Navy Frigates (FFG Class), including power, diesel power generators, lighting, communications, alarm annunciation systems, and weapons systems.

Education
MS Environmental Engineering, Washington State University, 1991
BS Civil Engineering, Washington State University, 1988

Registrations
Registered Professional Engineer (Civil), No. C 056641), CA, 1997 (exp. 6/30/01)

Professional Affiliations
American Society of Civil Engineers

Select Project Experience
A representative selection of Mr. Johnson's project experience is included below.

Phase II Environmental Site Assessment, Costco Wholesale, Gateway Center, Costco/Mulvanny Architects, Hawthorne, California. Conducted a Phase II environmental site assessment of this 44-acre site that consisted of over 75 historical addresses.

Mobil Marine Oil Terminal Berths 238-239, On-Call Environmental Assessment Contract with the Port of Los Angeles, California (1997 – 1999). Performed an investigation of the soil at the proposed locations of three land-side anchors at the Mobil Terminal. Prepared a site characterization report.

Clarifier Removal and Vapor Extraction of Chlorinated Solvents, Santa Fe Springs, California. Project manager for the removal of an underground industrial wastewater clarifier. Excavated impacted soil, performed additional site assessment activities for soil and groundwater, conducted a preliminary risk assessment analysis and wrote report for oversight agency review. Also installed a 100-cfm soil vapor extraction system with activated carbon filtration. Agency interaction included Los Angeles County Haz Mat, Department of Toxics Substance Control (DTSC) and the Los Angeles Regional Water Quality Control Board. A no-further-action letter was obtained from DTSC.

Former Underground Storage Tank (UST) Site, Canoga, California. Conducted groundwater pump test and soil vapor extraction testing. Analyzed groundwater pump test using "Aqtesolv". Performed groundwater pump scenario modeling using "Flowpath". Information from these tests was used in a corrective action plan that was submitted and approved by the local oversight agency.

Groundwater Monitoring, Southern California. Conducted quarterly groundwater monitoring at numerous hydrocarbon (NAPL) impacted sites and DNAPL impacted sites. Wrote quarterly groundwater monitoring reports.

Former Wood Preservative Facility, Los Angeles, California. Abandoned four groundwater monitoring wells using a mud rotary system. Wells were installed through a conductor casing into a confined aquifer.

Site Assessment and Remediation, Valdez, Alaska. Performed site assessment and remedial design at an electric utility, including drilling and logging boreholes, collecting soil samples for bioremediation studies, installing recovery and monitoring wells and conducted a slug test for hydraulic conductivity, a soil vapor extraction test, and an infiltration test. Designed and supervised construction of a mound leachfield and soil aeration system.

Fuel/Gas/Oil

Environmental Site Assessment and Remediation, Proposed Power Plant Expansion, Vernon, California. Project Manager for a site assessment program to identify the source of the release of 30,000 gallons of diesel fuel and assess its extent in order to develop a soil and groundwater remediation approach for rapid site clean-up. During plant expansion preparation in July 2001, the City demolished three large fuel above-ground storage tanks (ASTs), leaving one 1,000-barrel (42,000-gallon) tank containing diesel fuel remaining. In early September 2001 the City discovered that approximately 30,000 gallons of diesel fuel had disappeared from this AST during a 1-month period. On September 5, 2001 the City called and asked Kleinfelder to assess and remediate the site under an emergency action to avoid delaying planned plant expansion, for which a $30 million dollar order for gas turbine generators had been made. Kleinfelder was able to develop and implement a site assessment program in two days.

The Grove at Farmers Market, Los Angeles, California. Provided environmental engineering services as part of a geotechnical and environmental multidisciplinary team involved with redevelopment of a historic 9-acre parcel of land near downtown Los Angeles. The site was proposed to undergo remodeling and construction of new entertainment and retail services. Part of the property was used for oil production activities between 1910 and 1940. Former surface impoundments containing crude oil and partially refined petroleum products have been identified at the site. Performed a Phase II ESA and managed field staff to assess the lateral and vertical extent of petroleum-affected soils at the project site, and prepared the Phase II ESA report. Based on the results of the Phase II ESA, assisted in performing a performed a human health risk assessment to estimate appropriate cleanup levels for the site. Potential site remediation technologies were assessed with respect to cost, feasibility, coordination with the site development plans, and overall effectiveness.

GATX Carson Terminal, Bulk Fuel Storage Facility, Los Angeles, California. Analyzed pump test results from liquid petroleum hydrocarbon (NAPL) recovery wells at a bulk fuel storage facility. Constructed groundwater elevation contour maps, NAPL thickness contour maps, and NAPL elevation maps. Assisted in the preparation of monthly and biannual reports.

Gasoline Station, San Bernardino, California. Conducted Phase II site assessment work at a gas station. Tasks include installation of nine additional groundwater monitoring wells, groundwater sampling, soil vapor extraction test, slug test, and data analysis. This information was then used to develop a remedial action plan. The selected remedial alternative consisted of groundwater pump and treat, air sparging, and soil vapor extraction.

Bulk Fuel Facility, Valdez, Alaska. Field activities included well sampling for petroleum hydrocarbons, measuring water level/free phase liquid hydrocarbons and sampling wells for inorganic chemistry changes associated with groundwater remediation activities. Wrote quarterly groundwater monitoring reports.

Petroleum Facilities, Fairbanks, Alaska. Conducted slug testing at four sites in a region where groundwater movement can be affected by discontinuous permafrost, and determined hydraulic parameters to be used in remedial design.

Petroleum Refinery, Kenai, Alaska. Performed site assessment investigation. Field activities included drilling, soil sampling, and logging of boreholes; installing monitoring wells, field screening of soil samples; water level/free phase liquid hydrocarbon measurements; and groundwater sampling.

Manufacturing

Site Assessment and Remedial Investigation, Former Battery Casing Manufacturing Facility, Vernon, California. Managed Phase II site assessment for petroleum hydrocarbons and heavy metals. Wrote work plans and data evaluation reports, and evaluated remedial alternatives for lead impacted soil. Alternatives evaluated included on site soil fixation, capping, and off-site fixation.

Limited Environmental Sampling, Hoekstra Property, Mira Loma, Riverside County, California. Performed Limited Environmental Sampling to assess the potential presence of methane gas in vadose zone soils and pesticides/herbicides resulting from historical agricultural uses at the Hoekstra Property in Mira Loma, Riverside County, CA. The site occupies 127 acres and is proposed to be developed for future warehouses. Two holding ponds are present on the site which contain run-off water from an actively operating dairy on the site. Scope of work included health and safety management, methane probe installation and probe sampling.

Military

Site Assessment, Camp Pendleton Marine Corps Base, California. Managed and conducted field assessment activities at a hydrocarbon release located on a sloping site. Drilled 35 soil borings and installed 6 monitoring wells at the upper and lower slopes and within drainage ravines bordering two sides of the site. Evaluated vadose soils and perched groundwater zones for hydrocarbons. Prepared site assessment report (text, tables, and figures) for submittal to the oversight agency. Evaluated site remediation that utilizes multiple technologies: groundwater extraction, soil vapor extraction, bioventing, and soil excavation with off-site thermal desorption.

Madigan Army Hospital Medical Center at Fort Lewis, US Army Corps of Engineers (USACE), Tacoma Washington. Participated as a member of the field team for the USACE Building Survey. Wrote the Quality Assurance Program Plan and performed the building survey for hazardous materials, which included lead-based paint, asbestos, light ballasts potentially containing PCBs, heating oil tanks, and contaminated soils.

Icy Cape and Peard Bay DEW Line Stations, US Army Corps of Engineers (USACE), Alaska. Icy Cape and Peard Bay are Distant Early Warning (DEW) stations constructed during the cold war (late 1950's) on the northern coast of Alaska west of Barrow. Provided services under a multi-million dollar contract by the USACE to dismantle and remediate these stations during the summer of 1997. Served as the environmental consultant responsible for guiding soil excavations; soil screening using immunoassay test kits for TPH, DDT, and PCBs; made recommendations to USACE on where to collect samples; and collected soil, surface water, sediment and waste characterization samples. At Icy Cape, also sampled unknown drums and characterized their contents using a HAZCAT kit.

Ports/Harbors

GATX Annex, Chemical Storage Facility, San Pedro, California. Project manager for groundwater monitoring program. Developed wells and studied the influence of tidal fluctuations on groundwater table elevations at a former chemical storage facility. Analyzed groundwater chemical data containing volatile and semivolatile organics, constructed groundwater elevation and plume maps, and wrote quarterly groundwater monitoring reports.

Site Assessment, Former Creosote Facility, Port of Los Angeles, California. Under a consulting services agreement with the Port, supervised the abandonment of conductor cased monitoring wells using a mud rotary drilling system. Evaluated cross-contamination between upper and lower aquifers by video logging wells and evaluating conductor casing integrity. Conducted groundwater monitoring and site evaluation activities, as well as creosote extraction tests and a total fluids extraction test. Directed and installed 12 stainless steel monitoring wells to further delineate a creosote plume and gauged wells for creosote thickness. Analyzed groundwater gradients and dissolved plume concentration contours. Wrote reports (text, tables, and figures) documenting the site evaluation activities that were conducted at the former creosote facility. This information is being used to develop a remedial strategy for the site.

Site Assessment and Remediation, Port of Long Beach, California. Under a consulting services agreement with the Port, supervised the removal and site assessment of abandoned concrete sump filled with hydrocarbon waste and debris. Also project engineer for gauging and crude oil bailing of nine groundwater monitoring wells to evaluate site crude oil background conditions and develop site environmental strategy.

Site Assessment, Berths 144 and 147, Port of Los Angeles, California. Under a consulting services agreement with the Port, acted as the project engineer responsible for preparing the Work Plan and drilling six slant soil borings. The Port plans to replace the existing concrete wharf bulkhead and deepen the wharf by dredging to accommodate deep draft vessels. The slant borings were drilled at a 30-degree angle from horizontal in order to collect continuous core samples from beneath the existing concrete bulkhead. Soil samples were transferred to Ogden Environmental for Green

Book testing to determine suitability for ocean disposal. In order to collect the necessary volume of soil with continuous cores, state-of-the-art rotasonic drilling equipment was used, provided by Boart Longyear. This project was first that Boart Longyear used rotasonic drilling equipment at 30-degrees from horizontal. The borings were advanced from 60 to 106 lineal feet.

Site Assessment and Remedial Investigation, Former Battery Casing Manufacturing Facility, Vernon, California. Managed Phase II site assessment for petroleum hydrocarbons and heavy metals. Wrote work plans and data evaluation reports, and evaluated remedial alternatives for lead impacted soil. Alternatives evaluated included on site soil fixation, capping, and off-site fixation.

Residential

Brighton Gardens, Marriott Senior Living Services, Riverside, California. Currently performing environmental services for a proposed senior living facility. A rock quarry formerly occupied the site, and a geotechnical investigation at the site encountered artificial fill consisting of concrete, rubber, metal, wood and organic debris to 40 feet below ground surface (bgs). Services to date have included drilling (for soil sampling and chemical and refuse characterization), and a soil gas survey.

Groundwater Remediation, SheaHomes, Corona. Project engineer managing groundwater remediation and monitoring for extraction of free phase diesel product from the groundwater and remediation of the vadose zone by bioventing. Designed and managed modification of the remediation system to accommodate redevelopment and re-grading of the site into a baseball field as part of a residential home development.

Compass Homes, Yorba Linda. Involved with the design of methane mitigation systems to allow redevelopment of oil field sites for residential home developments. Currently managing of monitoring contractor construction activities for placement of the methane barrier membrane beneath foundations.

(UST Remediation) Soil & Groundwater Assessment from Leaking UST, Tricon, San Pedro. Assessed soil and groundwater for fuel hydrocarbons and methyl tertiary butyl ether (MTBE), resulting from a leaking UST at an off-site service station.

Groundwater Assessment, Target Store, Santa Fe Springs. Prepared work plan for supplemental assessment of groundwater for MTBE released from a former UST.

(UST Remediation) UST Remediation & Removal Activities, Target Store, Van Nuys. Reviewed previous Phase II and remediation documents of USTs, hydraulic

lifts and clarifiers, and prepared a report. Also prepared a soil management plan for upcoming site development activities, and will manage upcoming removal of a 12,000-gallon diesel UST.

(UST Remediation) UST Assessment, Sunrise Assisted Living, Claremont. Assessed two small USTs as part of due diligence. Performed third party oversight of UST removal activities.

<u>UST Remodel/Remediation</u>

City of Seal Beach Corporate Yard, Removal, Replacement and Upgrade of Underground Fuel Storage Tanks, Seal Beach, California. Project Engineer for the removal, replacement and upgrade of the existing UST fuel system through a three-phase design process, followed by field construction activities.

Hasco Oil, California. Managed quarterly groundwater monitoring and reporting.

La Sierra University, California. Managed quarterly groundwater monitoring and reporting.

Long Beach City Yard, Long Beach, California. Currently managing quarterly groundwater monitoring. Currently preparing remedial action plans.

Sunrise, Claremont, California. Assessed two small USTs. Performed Third Party oversight of UST removal activities as part of due diligence.

Shea Homes, California. Managing remediation of free product diesel plume, remediation system,. And quality groundwater monitoring.

Tricon, San Pedro, California. Assessed groundwater and soil affected by an off-site service station. Monitored UST release for fuel hydrocarbons and MTBE.

Tricon, KFE, Central Avenue. Managed removal of 8,500 gal. gasoline UST. Prepared closure report.

Vista Del Mar Hospital, California. Performed and managed supplemental Phase II assessment of a diesel release. Prepared report requesting site closure.

Belmont Village, California. Managed Phase II assessment of existing 5,000 gal. diesel UST. Prepared report of findings.

Target, Santa Fe Springs, California. Prepared workplan for supplemental assessment of groundwater for MTBE released from former UST.

Target, Van Nuys, California. Reviewed previous Phase II and remediation documents of USTs, hydraulic lifts and clarifiers. Prepared report. Prepared soil management plan for upcoming site development activities. Managing upcoming removal of 12,000 gal. diesel UST.

Transportation

Corridor, State of Alaska, Anchorage Alaska. Performed a preliminary site assessment investigation along a State of Alaska right-of way acquisition corridor. Performed soil gas sampling, collected shallow soil samples, drilled borings, installed groundwater monitoring wells, and inventoried and sampled drums on numerous properties.

Alameda Corridor Transportation Authority. Prepared a Work Plan for the Excavation, Transportation and Disposal of Petroleum Contaminated Soil for the Alameda Corridor Transportation Authority (ACTA) Henry Ford Grade Separation Project. The Work Plan discussed the remedial activities that are considered necessary for the removal of impacted soil along a utility corridor. Specifically, the Work Plan described the procedures for excavation, loading, transportation and disposal of petroleum impacted soil at the site. Following the completion of remedial activities, utility company representatives will install overhead and underground utility lines within the utility corridor.

Methane

Compass Homes Tract 15808, Yorba Linda, California. Project Engineer responsible for the construction monitoring of methane mitigation systems being installed for one new home out of 15 being constructed at a former oil field site. Construction monitoring tasks are being performed to comply with Orange County Fire Authority approved design specifications prepared by Kleinfelder. Activities being performed are monitoring of subgrade base material and vent lines, liquid boot installation, ventilation pipe installation, and post construction monitoring of structures for methane.

Compass Homes Tract 15735, Yorba Linda, California. Project Engineer responsible for the construction monitoring of methane mitigation systems being installed for 7 new homes out of 23 being constructed at a former oil field site. Mitigation systems consist of 4 sub slab passive venting systems, 3 methane barrier sub slab passive venting systems using liquid boot, venting of seven oil wells to flagpole risers, and street venting. Construction monitoring tasks are being performed to comply with Orange County Fire Authority approved design specifications prepared by Kleinfelder. Activities being performed are monitoring of subgrade base material and vent lines, liquid boot installation, ventilation pipe installation, and post construction monitoring of structures for methane.

Reinhold Industries, Santa Fe Springs, California. Project Engineer responsible for preparing scope of work and work plan for installation of 8 multi-depth soil gas probes at the site, and monitoring of the probes for methane, oxygen, and carbon dioxide. Results of the soil gas monitoring was provided in a letter report of findings with recommendations for methane mitigation for a new 50,000 square foot building and remodeling of existing buildings. Work was performed to comply with the City of Santa Fe Springs Ordinance 829.

Prologis Park Mira Loma, Riverside County, California. Project Engineer responsible for preparing scope of work for a soil gas survey of a 127-acre active dairy farm. Proposed development consists of three warehouses ranging in size from 5.1- to 1.64-million square feet. Performed a one-day soil gas survey using a Geoprobe rig and a field lab. Results of the soil gas survey were provided in a report with recommendations for further work and possible mitigation measures for methane detected at the site.

Western Pacific Housing, Riverside County California. Project Engineer responsible for preparing scope of work for a soil gas survey of a 70-acre active dairy farm. Proposed development consists of 250 residential houses and a park. Performed a one-day soil gas survey using a Geoprobe rig and a field lab. Based on the results of the methane levels found at the site, Kleinfelder is currently performing a methane mitigation evaluation of several alternatives.

Phase I ESA and Methane Screening, Tract No. 28821, Shea Homes, Norco, California. Performed a Phase I environmental site assessment to assess the potential impact resulting from the presence of pesticides, herbicides, solid waste, petroleum hydrocarbons and chlorinated hydrocarbons. The subject property, proposed to be developed for residential purposes, encompasses approximately 77 acres currently being used for agricultural purposes. The site had been used for growing crops since 1952; however, no records indicating dairy operations prior to 1952 were found during the preparation of the Phase I ESA report. Aside from crops, the subject property also houses a residential building at the northern end. Adjoining properties to the north and west are dairy farms. Also conducted methane screening survey assessed the potential presence of methane gas in vadose zone soils. The scope of work included health and safety management, methane probe installation and probe sampling.

Kaiser Harbor City Medical Center, Los Angeles, California. Project Engineer responsible for preparation of methane mitigation plans for four facility expansion projects consisting of a new parking garage, central plant expansion, relocation of a stairway, and the new Maternal Child hospital wing. Engineer of record for construction oversight, request for information responses, and project completion letter. Methane mitigation system consists of a membrane barrier with subslab passive ventilation system.

Constellation Place, Century City, California. Assumed responsibility as engineer of record for methane mitigation for a 35-story office tower and two parking garages in Century City. Engineer of record for construction oversight, request for information responses, and project completion letter. Methane mitigation system consisted of a membrane liner using HDPE, passive subslab ventilation system, and a continuous ventilation system for the ground floor spaces (Tower and Garages).

FDA Building, Irvine, California. Assumed responsibility as engineer of record for methane mitigation for the new FDA building which was constructed adjacent to the San Joaquin Landfill in Irvine. Engineer of record for construction oversight, request for information responses, and project completion letter. Methane mitigation system consisted of a membrane liner using HDPE, passive subslab ventilation system, and a methane gas detection system with activated building ventilation.

EZ-Lube, Los Angeles, California. Project engineer responsible for preparation of methane mitigation plans for the new automotive lubrication facility consisting of service bays with a basement service pit, office, and waiting area. Prepared methane mitigation plans consisting of a membrane barrier. Obtained plan check approval from the City of Los Angeles Building Department. Obtained approval for a request for modification from the Mechanical Department for ventilation. Construction pending.

<u>SPCC Plans</u>

Eagle Roofing, Rialto, California. Responsible engineer for preparation of the SPCC Plan for Eagle Roofing Products, Inc., a roof tile manufacturing facility located at 2352 North Locust Avenue in Rialto, California. The property is approximately 27 acres in size and contains manufacturing and storage facilities for concrete roofing tiles.

Utility Vault, Fontana, California. Responsible engineer for the preparation and update of the SPCC Plan for Utility Vault, which owns and operates a manufacturing facility at 10650 Hemlock Avenue in Fontana, California. The property is approximately 27 acres in size and contains manufacturing and storage facilities for precast concrete structures. One 2,000-gallon diesel fuel above ground storage tank (AST) is permanently located at the site and is used to fuel forklift trucks and other yard vehicles.

Weatherford Underbalance Services, Bakersfield, California. Responsible engineer for preparation of the SPCC Plan for Weatherford Drilling and Intervention Services, which provides mobile maintenance service for oil well drilling rigs in Bakersfield, California. The facility has the capacity to store 4,000 gallons of diesel fuel in an above ground, double walled, steel tank for their mobile maintenance truck rigs.

Vopak Terminal Los Angeles, Inc., Wilmington, California. Responsible engineer of preparation of SPCC Plan for Vopak Terminal Los Angeles Inc. Marine Terminal, located at 401 Canal Avenue, Wilmington, California. The Marine Terminal is a liquid bulk storage facility, which has 62 ASTs at the Marine Terminal, of which 40 contain petroleum product. The 40 ASTs containing petroleum product are used for the temporary storage of these products (e.g. Bunker fuel, diesel, fuel oil, cutter stock, and lube oil). The Marine Terminal has a maximum storage capacity of approximately 29 million gallons of liquid bulk petroleum and chemical product, more than 22 million gallons of which are petroleum products.

Pilot Chemical Company, Santa Fe Springs, California. Responsible engineer for the preparation of SPCC Plan for Pilot Chemical Company facility located at 11756 Burke Street, Santa Fe Springs, California. The approximately 3.5-acre facility has 45 above ground storage tanks/reactors/vessels. The petroleum product on site includes vegetable oils (e.g. coconut and safflower) and dilutent/dilute oil, gear/lube oil, and fuel.

Appendix N

Linscott, Law, & Greenspan Engineers
Résumés

RICHARD E. BARRETTO, P.E.
Principal

Professional Registration

Traffic Engineer, State of California (TR2006)

Professional Experience

Principal: Linscott, Law & Greenspan, Engineers
Associate Principal: Linscott, Law & Greenspan, Engineers
Transportation Engineer: Linscott, Law & Greenspan, Engineers
Transportation Engineering Intern: City of Costa Mesa, Transportation Services Division

Areas of Professional Competence

Traffic Forecasting and Impact Analysis Reports
Transportation Planning and Site Design Consultation
Mixed-Use Parking Demand Studies
Conceptual Improvement Plan Preparation
Traffic and Parking Field Studies
Detailed Capacity Evaluation
Signal Progression Analysis

Representative Experience

Traffic Impact Study and Parking Study Report for Kaiser Permanente Primary Care Center, Fontana, California. Traffic study evaluated the traffic and parking impacts of a 330,000 SF outpatient treatment facility on the existing Medical Center Campus. Site access design, internal circulation and conceptual off-site street improvements were prepared as part of this project's processing.

Site planning design consultation and study of internal circulation for the Arrowhead Regional Medical Center Colton, California. Traffic Impact Analysis Report for the 880,000 SF replacement medical center proposed by the County of San Bernardino. Conceptual street improvement plans and cost estimates for the proposed off-site street improvement, to include the Pepper/I-10 interchange, were prepared.

Traffic Impact Analysis Report for the Sunshine Canyon Landfill Extension project in the County of Los Angeles. The study focused on evaluating the potential truck traffic impact at 13 study locations in the Sylmar community of Los Angeles.

Traffic Impact Analysis and Parking Study Report for One Golden Shore, Long Beach, California. The traffic study focused on evaluating the potential traffic impacts of two office towers totaling over 725,000 GSF in office space and a 350 room hotel on the circulation system of downtown Long Beach.

Traffic Impact Study for the El Embarcadero-Windham Grade Separation, Port of Long Beach, California. The traffic study evaluated the probable traffic impacts of three design alternatives for an elevated grade crossing for El Embarcadero-Windham Avenue at railroad tracks in the Port of Long Beach.

Traffic Analysis and Site Planning Evaluation for Universal City. The study analyzed future traffic conditions and needs with respect to the internal circulation system at the "top of the hill" with the development of several planned MCA projects to include tour and attraction expansions, hotel additions, and additions to City Walk.

Traffic Impact Study for Empire Center, Fontana, California. The project consisted of over 1.5 million square-feet of retail/commercial uses and included a regional mall, an entertainment center, a neighborhood community center, and a promotional center.

Traffic Impact Study for Prado De Las Posas, Camarillo, California. Traffic study focused on evaluating the potential traffic impacts of a mixed use development that included a 285,600 SF village commercial center, 151,316 SF of R&D uses, and an 18.8 acre, nine-hole executive golf-course with a 15,000 SF clubhouse.

Traffic Impact Study for Park Place, Irvine, California. The traffic study focused on evaluating the potential traffic and circulation impacts with the development of 360 residential units of the Park Place Development Plan. The Park Place Development Plan consists of over 1.7 million SF of new office space, a day care facility, a health club, a 200 room hotel, 71,500 SF of restaurant floor area, 90,000 SF of retail uses, a 2,000 seat theatre, a potential 10,000 SF night club and 1,442 apartments/ condominiums. The traffic study required an evaluation of traffic modeled data provided by the City of Irvine.

Traffic impact evaluation and conceptual intersection improvement design plans for Country Club Falls Shopping Center (304,422 SF) and Desert Crossing Center (479,400 SF), Palm Desert, California.

Education

University of California, Irvine, B.S. in Civil Engineering
University of California ITS Extension laboratory, Richmond, (3.5 ceu).
Transportation Planning Models and Software Applications
And Transportation Planning Model (TRANPLAN)

Professional Memberships

Institute of Transportation Engineers, Associate Member
American Society of Civil Engineers, Associate Member

DANIEL A. KLOOS, P.E.
Transportation Engineer III

Professional Registration

Traffic Engineer, State of California (TR 2200)

Professional Experience

Transportation Engineer: Linscott, Law & Greenspan, Engineers
Assistant Project Engineer, DeSilva Gates Construction

Areas of Professional Competence

Traffic Impact Analysis Reports
Transportation Planning
Traffic Control Design
Pavement Delineation Design
Roadside Sign Design
Sight Distance Analysis
Traffic Signal Warrant Analysis
Parking Demand Analysis
Trip Generation Studies

Representative Experience

East Chino Tentative Tract 16248 Project – Traffic Engineer for the Traffic Impact Analysis Report in the City of Chino, California. This study addressed the potential near-term and long-term traffic impacts associated with the development of a single-family residential subdivision. A signal warrant analysis was performed to determine whether or not the proposed development would warrant the installation of traffic signals at key intersections within the project's vicinity.

Home Depot Project – Traffic Engineer for the Traffic Impact Analysis Report in the City of San Juan Capistrano, California. This study addressed City of San Juan Capistrano staff concerns, as well as the potential near-term traffic impacts and "summer" traffic impacts associated with the development of a home improvement store.

North Long Beach Police Station Project – Traffic Engineer for the Traffic Impact Analysis Report in the City of Long Beach, California. This study addressed the potential near-term traffic impacts associated with the development of a police station. Two project alternatives were proposed to maintain acceptable levels of service at all key intersections.

Harbor Boulevard Storm Drain Installation – Traffic Engineer for the design of traffic control and detour plans. The design focused to provide for the safe and orderly movement of vehicular traffic during which roadway improvements were being implemented. The roadway construction involved three stages of development.

Del Obispo Street Median Modification – Traffic Engineer for the Traffic Circulation Study in the City of Dana Point, California. This study addressed the potential traffic/circulation impacts of the proposed raised median island on Del Obispo Street, the associated impact of diverted (re-routed) traffic to key signalized and key unsignalized intersections, and evaluated the access/egress needs of existing development along the Del Obispo Street study area.

Manhattan Country Club – Traffic Engineer for the Parking Demand Analysis for the Manhattan Country Club (MCC) Tennis Courts Expansion project, located in the City of Manhattan Beach, California. The parking analysis focused on determining the existing and future parking needs of the MCC, and the availability of parking with the addition of two, "clay" tennis courts on a portion of the City "leased" parking lot.

Alton Corporate Center Project – Traffic Engineer for the Traffic Impact Analysis Report in the City of Santa Ana, California. This study addressed the potential traffic impacts associated with the development of two office buildings for existing, future near-term and future long-term peak hour traffic conditions, as well as access/egress into the proposed site.

Freight Forwarding – Traffic Engineer for the Traffic Analysis Report in the City of Hawthorne, California. This study addressed the potential traffic impacts associated with the development of freight forwarding land uses on three separate planning areas. Trip generation studies were conducted at four sites to develop daily, AM peak hour, and PM peak hour trip rates. A midblock link analysis was performed to determine the levels of service at sixteen key street segments located within the immediate vicinity of the three separate planning areas.

Norwalk Transportation and Public Services Facility Master Plan – Traffic Engineer for the Traffic Impact Analysis Report in the City of Norwalk, California. This study addressed the potential traffic impacts and circulation needs associated with the redevelopment and expansion of the existing Norwalk Transportation and Public Services Facility.

Education

University of California, Irvine, B.S. in Civil Engineering
(specialization in Transportation Engineering and Structural Engineering)

Appendix N

Moffat & Nichol Engineers
Résumés

JAMES DAVID FAUL, P.E.
Chief Civil Engineer

REGISTRATION

Registered Professional Engineer, California Registration No. C52258

EDUCATION

Civil Engineering, San Diego State University
Engineering/Architecture, Ventura College
Environmental Management Certificate, West Coast University

REPRESENTATIVE PROJECTS:

Mr. Faul has twenty (20) years of experience covering all aspects of civil engineering design as it relates to urban development. Prior to joining M&N, Mr. Faul served for more than three years in the City of Temecula's Department of Public Works where he was involved in all phases of development projects and effectively managed and coordinated numerous consultants. His project experience includes capital improvement projects, waterfront and residential developments, and commercial centers.

As Chief Civil Engineer and a project manager, he directs the activities of his project team. In this role, he is responsible for each project's technical quality, scope, schedule and budget as well as communication with the client to ensure satisfaction with the work performed.

REPRESENTATIVE PROJECTS

Long Beach Memorial Medical Center Expansion, Long Beach, California

San Pedro Waterfront Promenade, Port of Los Angeles, California
Project Manager for the public input, concept development and final design for a public promenade along Berths 87-90 in the Port of Los Angeles. The work includes landscape and hardscape improvements to Harbor Boulevard, street alignment, signalization, and public plazas. Specific areas of responsibility include civil design of streets, sites, and utilities, grading plans, utility investigations and coordination, public meeting presentations, and permit processing.

San Pedro Waterfront Transportation Study, San Pedro, California
Project Manager for the preliminary analysis of transportation issues related to proposed development of traffic generators in port areas along the San Pedro Waterfront.

North Embarcadero Waterfront Redevelopment & County Administration Center Waterfront Park, San Diego, California
Project Manager/Chief Civil Engineer responsible for construction documents, estimates, exhibits, utility relocations and street improvements for the redevelopment of the San Diego waterfront from the San Diego Airport south to the Seaport Village commercial center. The historic County Administration Center property is also being redeveloped to accommodate a public park area and construct an underground parking structure beneath the proposed park.

Seabridge in Mandalay Bay, Oxnard, California
Project Manager/Chief Civil Engineer responsible for coordinating coastal engineering related issues and permit acquisition during the Tentative Map portion of a 135-acre mixed-use residential, commercial, waterfront and marina-related facilities that is to be part of the Channel Islands Harbor of Oxnard.

JAMES DAVID FAUL, P.E.
Chief Civil Engineer

Laguna Del Mar, Mexico
Chief Civil Engineer responsible preparation of construction documents to dredge and excavate for a salt-water lagoon and multiple salt-water lakes in support of a golf course and residential development. Unique design issues included the existing land was a sand desert and the lakes are to be tidal due to the proximity to the ocean.

Bay-to-Bay Project, San Diego, California
Chief Civil Engineer responsible to analyze the impacts of existing transportation, utility, and property related to alternatives to connect the San Diego Bay with Mission Bay that does not currently exist. Alternatives include creating a tidal water canal that would enable boaters to traverse from San Diego Bay to and from Mission Bay while creating a significant amount of urban waterfront. Unique design concerns have included the impacts of tides and water circulation along with the estimated costs to raise roadways over the proposed canal and mitigate existing utility crossings.

Laguna Beach Sewer Pump Station, Laguna Beach, California
Chief Civil Engineer responsible for alternative designs, profiles and estimates for relocating an existing sewer main in the business district of downtown Laguna Beach. Alternative designs included wet wells, gravity flow, force main flow and pumps while maintaining access to local shops and roadways including the busy Pacific Coast Highway while under construction.

Diamond Valley Lake Marina; Hemet, California
Chief Civil Engineer responsible for preparing construction documents, estimates, construction quantities, typical cross sections, and profiles for an access roadway, parking area and launch ramp facility at the newly created Diamond Valley Lake.

Cabrillo Marina –Phase II; San Pedro, California – Port of Los Angeles
Chief Civil Engineer responsible for infrastructure design for the development of an approximately 700 slip marina and 50 acres of waterfront property to include a promenade, marine retail center, restaurants, dry stack storage and boat launch facilities, and a yacht club.

Multiple 3-D Visualization Projects
Project Manager/Chief Civil Engineer responsible for creating 3-D visualization exhibits and videos for numerous projects. The 3-D products are used in public presentations, project interviews, client and design team meetings, agency reviews and agency approvals. Typical 3-D modeling projects have included underground utilities, structural tiebacks, developments, freeway interchanges, bridges and urban waterfronts.

Playa Vista Development, Los Angeles, California
Project Manager responsible for site and utility designs as well as street improvements for multiple projects including the Visitor & Information Pavilion, a Community Center and two Apartment Complexes within the first phase development of Playa Vista, a 1,087-acre, mixed-use Master-Planned community at the western edge of Los Angeles. These projects included high-rise residential buildings and subterranean parking structures as well as landscape/hardscape improvements.

California State University, Northridge, California
Civil Engineer responsible for site design supporting the reconstruction of Oviatt Library to repair damage resulting from the 1994 Northridge earthquake. Reconstruction of the site required a new stairway as well as civil redesign of Stonepine and the Sierra Quad. Civil engineering services included grading, utilities and hydrology.

Fountain Park Apartments (Playa Vista), Los Angeles, California
Project Manager responsible for site and utility designs as well as street improvements for an apartment project within the first phase development of Playa Vista, a 1,087-acre, mixed-use Master-Planned community at the western edge of Los Angeles. The project included a 4-story, 401,832-square foot residential building and subterranean parking structure on 10 acres.

Loyola Marymount University/Burns Recreation Center, Los Angeles, California
Responsible for grading and utility plans, drainage, horizontal control, and construction administration for the new Burns Recreation Center. This project required that an existing gym be demolished to make way for a new 70,000 square foot facility that will include a gym, outdoor swimming pool and pool house.

Loyola Marymount University/Miyawaki Library, Los Angeles, California
Responsible for site design supporting new construction of the 80,000 square foot Miyawaki Library. The project included construction of the three-story structure and basement, a pedestrian bridge connection to the existing library, and a courtyard/amphitheater. Services provided included grading, utilities, hydrology, and permit and construction consultation.

Plaza at the Arboretum, Santa Monica, California
Responsible for the site design supporting a new six-story, 350 unit (307,000-square foot) residential building incorporating 10,000 square feet of retail space. Engineering services have included grading, utilities, street widening, new 14-inch public water line, hydrology, and permit and construction consultation.

Sherman Oaks Galleria, Sherman Oaks, California
Project Manager responsible for site design and street mitigation for the former shopping mall which was reopened in November 2000 as an office complex. The new Galleria includes office space as well as a collection of upscale shops and restaurants, with an outdoor plaza and fountain at the entrance. Civil engineering services included site grading, site utilities, fire hydrant relocations, street improvements and streetscape enhancements, and permit and construction consultation. The sidewalk and landscaping improvements to several City blocks of existing public streets that included unique vertical grade challenges that had to meet ADA standards. Placement of new tree well grates had to be coordinated with existing utilities (below grade and above grade structures).

Sunset Millennium, West Hollywood, California
Responsible for research and reports to investigate the utility demands of the proposed Sunset Millenium project, a 662,820-square foot commercial development spanning portions of three city blocks in West Hollywood.

Target Store, Santa Monica, California
Target's first three-level store located in the downtown area of Santa Monica. Responsible for site design including grading, utilities and permit consultation for the project, which included a four-level subterranean parking structure.

The Legacy at Wilshire, Los Angeles (Westwood), California
Legacy Partners developed a 213,358-square foot, 187 unit luxury residential building and subterranean parking structure on 2.66 acres of vacant land at 10833 Wilshire Boulevard. Responsible for providing engineering consultation services during the design development phase to assist the design team on issues including building height, shoring and haul route permits, and vertical slopes of garage access.

Las Flores Creek Realignment & Park, Malibu, Los Angeles County, California
Project Manager for civil engineering services related to the improvement of this park located in Los Angeles County. Responsibilities included the preparation of a grading exhibit, modification to the hydrologic study of the site to accommodate changes in the creek bed and allow for flood control and protection of the creek and surface features.

Infomart at Terminal Annex, Los Angeles, California
Project Manager responsible for civil engineering services for the interim-parking phase for the Infomart Los Angeles at Terminal Annex located adjacent to Union Station. Project included preparing an interim parking exhibit, providing field verification of existing on-site fencing, and coordinating client meetings with the Client, public agencies and other consultants to obtain plan approvals.

First San Diego River Improvement Project, San Diego, California
Senior Design Engineer for channel improvements utilities, street crossings, and pedestrian/bike path along both sides of the San Diego River between Highway 163 and I-805 in Mission Valley. Other design included grading, ADA access, parking and cross-slope.

Santa Monica College, Santa Monica, California
Project Manager responsible for the demolition of existing swimming pool and construction of a new addition to the existing parking structure. The pedestrian access and construction phasing for this project was critical as the work was done during classes in session. Existing pedestrian flows had to be maintained to enable access to existing classrooms.

Sherman Oaks Galleria Streetscape Improvements, Sherman Oaks, California
Project Manager responsible for sidewalk and landscaping improvements to several City blocks of existing public streets that included unique vertical grade challenges that had to meet ADA standards. Placement of new tree well grates had to be coordinated with existing utilities (below grade and above grade structures).

Santa Monica Business Park, Santa Monica, California
Project Manager responsible for the reconfiguration and enhancement of existing surface parking lot.

Citrus Valley Hospital, Citrus Valley, California
Project Manager responsible for the reconfiguration and enhancement of existing surface parking lot.

Civil and Street Design

Liefer Road Bridge (PW93-02), Department of Public Works Projects, City of Temecula, California
As a City of Temecula employee, responsible for project management, consultant selection and management, plan check and review, public relations, preparation of City Staff Reports and bid docuements, contract negotiation and resolution, Construction Administration, and preparation of the Notice of Completion for the construction of a pre-fabricated concrete structure bridge extension of Liefer Road and channel improvements to the Santa Gertrudis Creek as a result of the 1993 floods. Received a Letter of Commendation form the Director of Public Works for efforts on this City of Temecula public works project.

Harry Bridges Boulevard Realignment, Wilmington California
Project Manager responsible for civil engineering services involved in the 1.2-mile long realignment of an existing roadway as a result of the Port of Los Angeles' expansion of one of their major terminals at the harbor in San Pedro. Secured conceptual approvals and managed the preparation of construction

drawings and permit acquisition for the Port's major arterial located within the City of Los Angeles. Substantial coordination with utility providers and emergency response agencies was performed. In addition, also responsible for coordinating and administering the contracts with consultants for landscaping, soils, traffic and structural engineering as well as public relations.

Wilmington Parkway, Wilmington, California
Project Manager responsible for civil engineering services for this linear park and elevated promenade that traverses approximately 0.6 miles along the southerly side of an existing City street. Responsible for providing exhibits/graphics/reports needed in order to amend or supplement the existing EIR of the project including, drainage/hydrology studies, utility studies, street closures, and ancillary engineering studies. Street closures, a Tract Map, and easement documents were also involved as well substantial coordination with utility providers and emergency response agencies.

Alta Loma Road & Sunset Boulevard, West Hollywood, California
Project Manager responsible for conceptual approvals, preparation of construction drawings and permit acquisition of the back-to-back cul-de-sacs of the existing 12% grade of Alta Loma Road and the widening of Sunset Boulevard in the densely populated area of the Sunset Strip of West Hollywood as part of the proposed Sunset Millenium project, a 662,820 square foot commercial development spanning portions of three city blocks in West Hollywood. Construction phasing, traffic circulation, existing utility relocations, retractable bollards, and fire truck access were key issues in the design and construction. Substantial coordination with utility providers and emergency response agencies was performed.

Colorado Boulevard, Santa Monica, California
Project Manager responsible for preparation of construction drawings and permit approvals for the widening of this busy section of Colorado Boulevard supporting a new six-story, 350 unit (307,000-square foot) residential building incorporating 10,000 square foot of retail space. Engineering services have included utilities, street widening, new 14-inch public water line, hydrology, and permit and construction consultation.

Wilshire Boulevard, Los Angeles (Westwood), California
Project Manager responsible for preparation of construction drawings and permit approvals for the widening of Wilshire Boulevard in the heart of Westwood, CA. Construction phasing, traffic circulation, existing utility relocations, and building moratoriums for this extremely busy business corridor of Los Angeles were key issues in the design and construction.

Ventura Boulevard and Sepulveda Boulevard, Sherman Oaks, California
Project Manager responsible for preparation of construction drawings and permit acquisition for street and landscaping improvements to several City of Los Angeles blocks of existing public streets that included unique vertical grade challenges that had to meet ADA standards. Placement of new improvements had to be coordinated with existing utilities (below grade and above grade structures) and expeditious approvals of these improvements within existing City & Caltrans Rights-of-Way were needed. Project was showcased in the January 2002 edition of California.

PROFESSIONAL AFFILIATIONS

Member, American Society of Civil Engineers

EDWIN P. REYES, P.E.
Civil Engineer

REGISTRATION

1995, Civil Engineer, California, C53584, Exp. Date 6/30/07
1994, Certificate, Construction Project Management, UCLA

EDUCATION

BS, 1987, Civil Engineering, Mapua Institute of Technology, 1987

EXPERIENCE

Mr. Reyes has over 15 years of experience in providing geometric and vertical grade designs, utility and consultant coordination and right-of-way determination. He is skilled in conceptual designs, cost estimates, and economic analysis inclusive of streets, storm drain and site development. Excellent in computer-aided design and drafting with knowledge of AutoCAD 2003, Land Development Desktop, COGO, Storm Plus, HEC2 and Excel.

REPRESENTATIVE PROJECTS

Long Beach Memorial Medical Center Expansion, Long Beach, CA

Sewer Improvement Design Review Study, City of Laguna Beach, CA
Senior Civil Engineer responsible for the evaluation of five (5) sewer collection and distribution alternatives that were proposed to accommodate the installation of a reinforced concrete box culvert in downtown Laguna Beach. Civil design and analysis included peak station flow analysis, sewer line sizing, and constructability risk assessment.

Multiple Public Works Projects in Various Cities
Project Manager and Engineer responsible for numerous public works projects for the City. Projects included parking lot grading, bike path realignment, utility relocation and permit processing. Specific projects included:

North Embarcadero Visionary Plan, San Diego, CA
Performed preliminary utility conflict analysis.

County Administration Center Waterfront Park, San Diego, CA
Performed utility relocation, site grading and site demolition.

Greenville-Banning Low Flow Diversion, Huntington, Beach, CA
Designed low flow diversion conduit from the channel pump station to the OCSD trunk sewer line. Completed traffic control plans and bike path detour plans in accordance with the City of Huntington Beach requirements.

Laguna Beach Pump Station, Laguna Beach, CA
Coordinated with the utility companies, analyzed and calculated conceptual design estimates for the relocation of main sewer line along a commercial district per the requirements of the City of Laguna Beach.

Carnival Cruise Terminal Parking Structure, Long Beach, CA
Performed utility relocation, site grading and permit processing for the entire site. Coordinated with the City of Long Beach and the private developer for a smooth construction schedule.

Tustin Ranch Road Extension, Tustin, CA
Designed preliminary roadway alignment, utility impact analysis and right of way determination in the overhead crossing project with the SCRRA, OCPFRD and Edinger Avenue.

EDWIN P. REYES, P.E.
Civil Engineer
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Sand Canyon Avenue Undercrossing, Irvine, CA
Designed roadway alignment, utility relocation and right of way determination in the grade separation project with the SCRRA. Assisted the City of Irvine in creating a project report for project funding submittal to the State.

Cherry Avenue Widening, Signal Hill, CA
Analyzed right of way acquisition, traffic patterns and generated roadway alternatives for the preparation of a project study report. Assisted the City of Signal Hill to gather approval for public funding from the County of Los Angeles MTA.

Brighton Street Resurfacing, La Habra, CA
Designed water and sewer line relocation, street resurfacing, and coordinated with the utility companies regarding the proposed project. Coordinated with the City representative to satisfy the City of La Habra requirements.

Multiple Ports / Backland Projects
Project Manager and Engineer responsible for numerous port projects all around the country. Projects included terminal and backland grading and utility relocations, permit processing, pavement failure analysis and master plan cost estimating. Specific projects included:

- Berth 171-181, Port of Los Angeles / Pasha Terminal
- Radiation Portal Monitor, Port of Los Angeles / Port of Long Beach / Homeland Security
- Pierce County Terminal, Port of Tacoma
- Terminal 46 Redevelopment, Port of Seattle
- Berth 215-219, Port of Los Angeles / YTI Terminal
- Norfolk International Terminal North and South, Virginia Port Authority
- Barbours Cut Terminal, Port of Houston
- Pier G & J Terminal, Port of Long Beach

Multiple Public Works Projects in the City of Industry, CA
Project Manager and Engineer responsible for numerous public works projects for the City. Projects included street reconstruction, sidewalk construction, and traffic control determination. He completed plans, specifications and cost estimates for projects using computer aided design and drafting. Coordinated with utility companies and property owners affected by the city's capital improvement projects. Handled pre-bid inquires by contractors bidding on the city's projects and offered construction support for projects undergoing construction. Specific projects included:

- Industry Hills Equestrian Center Rodeo Arena Structural Cover
- Crossroads Parkway Street Resurfacing
- Business Parkway Reconstruction and Resurfacing
- Nelson Avenue Sidewalk Improvements
- Arenth Avenue Street Reconstruction
- Proctor Avenue Street Resurfacing

Multiple Public Works Projects, Los Angeles County Metropolitan Transportation Authority (LACMTA), CA
As Civil Engineer prepared project plans for the development of a portion of the County's Metrorail program. Specific projects included:

- Hollywood Boulevard & Western Avenue Station – Metro Redline
- North Hollywood Station – Metro Redline
- Metro Pasadena Project Yard & Shop Facilities

EDWIN P. REYES, P.E.
Civil Engineer
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Design Engineer, Miscellaneous Transportation Projects, Southern California
Calculated and designed public works projects for a variety of State, County and City clients. Submitted plans ahead of schedule and achieved objectives within the allotted budget. Specific projects included:

- I-215 Preliminary Engineering – Riverside, California
- Hollywood Boulevard/Vine Avenue Station – Metro Redline
- Metro Greenline Extension Preliminary Study
- Route 74 Feasibility Study – Riverside, California
- Route 126 Feasibility Study – Ventura County, California
- Valley Circle Boulevard/Route 101 Interchange Improvements – Ventura County, California
- Haven Avenue/I-10 Interchange Improvement – San Bernardino, California

Appendix N

Sapphos Environmental, Inc.
Résumés

Andre Anderson, REA, CES

MS, Environmental Engineering, University of Southern California, 1979

Environmental Analyst III

Years of Experience: 24

Relevant Experience

- *Conduct Phase I, II, and III Environmental Site Assessments*
- *Collect data through interviews with regulatory and permitting agencies*
- *Collect data related to past land use*
- *Conduct searches of databases related to known contaminated sites*
- *Conduct asbestos surveys*
- *Conduct subsurface investigations including soil and groundwater sampling and remediation*
- *Conduct air quality studies*
- *Conduct radon gas surveys*
- *Conduct lead-based paint surveys*
- *Supervise disposal of hazardous materials*
- *Perform regulatory compliance evaluations*

Mr. Andre Anderson provides environmental consulting services to various clients including property management companies, governmental agencies, financial institutions, and engineering firms. Services provided include Phase I, II, and III environmental site assessments, underground storage tank system installation and removal, soil and groundwater sampling and remediation, indoor air quality studies, radon gas surveys, lead-based paint surveys, hazardous materials management, and regulatory compliance.

Mr. Anderson has managed an environmental project department and coordinated environmental projects in accordance with established schedules, budgets, and regulatory requirements. He has produced in-house procedures for conducting all phases of environmental assessments, prepared and reviewed work plans and final reports, supervised subsurface investigations, and was responsible for regulatory compliance of all projects.

Mr. Anderson has been responsible for projects related to hazardous materials management including supervision and performance of environmental assessments, subsurface investigations, and asbestos surveys. He has managed production of environmental impact reports, prepared industrial waste discharge permits, conducted noise and traffic analyses, and generated air-quality computer models.

Mr. Anderson has managed site assessment activities, developed and implemented soil plans, designed remedial action plans, and supervised packaging, transportation, and disposal of hazardous materials. He has conducted asbestos surveys, prepared air quality permits, prepared environmental impact statements, performed regulatory compliance evaluations for fossil, nuclear, and alternative energy power plants, conducted engineering cost analyses for hazardous waste management, storage and disposal systems, and designed mechanical systems for gaseous, liquid, and solid hazardous waste processing.

Mr. Anderson has generated environmental qualification calculations, prepared and administered bid evaluations and specifications for radioactive waste systems equipment, revised and maintained system descriptions and design manuals, and conducted field verification of mechanical systems design for nuclear power generating stations.

Mr. Anderson has designed sewers, storm drains, and wastewater treatment systems, and he has conducted infiltration/inflow analyses and septic tank-leach field evaluations.

Edward Belden, MESM

MA, Environmental Science and Management, Conservation Planning, Donald Bren School of Environmental Science, University of California, Santa Barbara

Habitat Restoration Specialist

- *Construction and Maintenance Monitoring*
- *Riparian Restoration Monitoring*
- *Streambed Alteration Agreement Coordination*
- *Environmental Impact Analysis*
- *Watershed Analysis*
- *Water Quality Analysis*
- *Identification of California Plant Communities*
- *GIS Analysis*
- *Directed Surveys*
- *Statistical Analysis*

Years of Experience: 2

Relevant Experience:

- *Restoration of Riparian and Coastal Scrub Habitat*
- *Preparation of CEQA/NEPA Documents and peer review of biological sections*
- *Numerous directed surveys and data analysis*
- *Managed data collection for Federal Projects with Louisiana Department of Wildlife and Fisheries*
- *Published in Peer Reviewed Journal*

Mr. Edward Belden holds a MESM with broad experience in the environmental field with an emphasis on green building and habitat planning. His knowledge and experience covers opportunity and constraint analyses, field surveys, mapping of habitat and sensitive species, identification of native/invasive plants, development of restoration plans and CEQA/NEPA compliance documentation.

While at Sapphos Environmental, Inc., Mr. Belden has conducted numerous construction and maintenance monitoring efforts, performed quantitative analysis of riparian restoration sites, completed biological technical reports, coordinated streambed alteration agreement work efforts, and conducted numerous biological surveys in developed and undeveloped regions from desert (Kern County) to riparian (Orange County) plant communities. Mr. Belden is knowledgeable of environmental impact assessment legislation, having completed biological sections and peer reviews of CEQA and NEPA documents.

Before joining Sapphos Environmental, Inc., Mr. Belden served as a biologist with the Louisiana Department of Wildlife and Fisheries to collect samples and manage data for three federal projects. His field experience includes habitat construction monitoring, estimates of plant cover, mark-recapture, tree surveying, destructive root sampling, development of a data logger system, and integrated pest management within various communities including Oak Woodlands, Coastal Sage Scrub, Eastern Hardwoods and Wetlands. Mr. Belden took an active role in the restoration of the Arroyo Hondo Preserve riparian corridor along the Gaviota Coast of Santa Barbara County to protect and enhance the habitat of endangered steelhead trout through replanting of natives and removal of invasive species.

Mr. Belden's master's thesis evaluated the environmental impacts of rice production on the water resources within Tanzania for the United Nations Environment Program. The interdisciplinary graduate education Mr. Belden received allowed for an interest in green building and alternative energy systems to be explored through courses in energy economics, land use planning and law, landscape, community, population, and restoration ecology in addition to classes addressing planning and environmental rules and regulations such as the ESA, Clean Air Act and CEQA/NEPA. While studying in Denmark, Mr. Belden also studied Marine Science and Environmental Policy.

Member of the Association of Environmental Professionals and the California Native Plant Society.

Marie Campbell, MA

MA, Geography, Geomorphology /Biogeography, University of California, Los Angeles, 1988

Project Manager/Environmental Compliance Specialist

- *Ensure technical and procedural adequacy pursuant to NEPA, CEQA, and other federal, state, and local statutes and regulations*
- *Provide strategy for regulatory permit compliance*
- *Agency coordination*
- *Coordination with Special Interests*
- *Identify opportunities for issue resolution*
- *Public Outreach*
- *Quality assurance/quality control*
- *Milestone compliance*

Years of Experience: 20

Relevant Experience:

- *Managed 12 open-end contracts for environmental services*
- *Project Manger, Plaza de Cultura y Arte EIR*
- *Environmental Compliance Specialist to the EIR for the Specific Plan for the Development of Stat*
- *Technical expert to successfully support client in 5 CEQA lawsuits:*
- *Longden Reservoir, Van Nuys Reservoir EIR,*
- *Bonelli Regional Park EIR, Friendship Community Regional Park EIR,*
- *Hollywood Bowl EIR,*
- *Owens Dry Lake State Implementation Plan EIR*

Ms. Campbell, principal of Sapphos Environmental, Inc. is an environmental compliance specialist with over 20 years experience in project management of all aspects of environmental documentation, mitigation monitoring, and resource management planning. Having served as project manager for several hundred NEPA and CEQA environmental compliance documents, she has an extensive knowledge of federal, state, and local environmental statutes and guidelines. In addition, her training in negotiating, bargaining, and conflict resolution makes her uniquely qualified to work with the public and agency representatives on complex projects.

In the past 11 years, she has successfully coordinated over 12 open-end contracts for environmental services for Caltrans, Metropolitan Water District of Southern California, County of Los Angeles Department of Recreation, County of Los Angeles Department of Public Works, the City of Los Angeles Bureau of Engineering, Great Basin Unified Air Pollution Control District, and Southgate Recreation and Park District. These contracts have involved coordination of multidisciplinary teams including architecture and design firms, structural engineering, civil engineering, marketing and image consultants, geotechnical firms, hazards and hazardous materials, and traffic, transportation, and parking.

In particular, Ms. Campbell has extensive experience with capital improvement projects undertaken by the County of Los Angeles. Ms. Campbell worked directly with County Counsel in the successful defense of two EIR prepared for the County of Los Angeles Board of Supervisors. She served as project manager or senior technical advisor for numerous challenging and high-profile projects: Plaza de Cultura y Arte EIR, Grand Avenue and Environs project EIR, the Hollywood Bowl Shell Rehabilitation and Acoustical Improvements project EIR, Addendum No. 2 to the First Street Properties (Walt Disney Concert Hall) EIR, Bonelli Regional County Park Master Plan EIR, and Deane Dana Friendship Community Regional County Park EIR. These projects have routinely involved interface with project engineering and architctural design teams to ensure that the EIR fully addresses feasibility in light of the technical engineering, economical, and environmental characteristics of the project, thus fully informing the public and the County of Los Angeles Board of Supervisors in their decision-making process. Ms. Campbell has strong working relationships with numerous County Department including, the County of Los Angeles Chief Administrative Office, the Department of Public Works, the Department of Parks and Recreation, and the Department of Regional Planning.

Ms. Campbell's career began with the Corps as an environmental protection specialist with the U.S. Army Corps of Engineers giving her broad breadth related to all federal, state, and local statutes and regulations.

Ms. Campbell serves on the State Board of the Association of Environmental Professionals. In addition, she teaches a graduate seminar on Landscape Planning at California Polytechnic University at Pomona.

Eric Charlton

BA, Geography, University of California, Riverside, 1985

Certificate in GIS, University of California Riverside, Riverside, California, 1998

GIS Analyst

- *GIS project development and management*
- *GIS analysis and problem solving.*
- *GIS data acquisition conversion, maintenance, and documentation*
- *Cartographic production and design*
- *Application and script development in Avenue, AML, and VB for specialized tasks, to customize the user interface, and automate repetitive processing and map production tasks*
- *Database design and Maintenance*

Years of Experience: GIS, 6 years, Urban Planning, 8 years

Relevant Experience:
- *Biological Monitoring, Cottonwood Wind Energy*
- *Owens Valley PM10 Planning Area Demonstration of Attainment SIP Project EIR*
- *Ahmanson Ranch Specific Plan*
- *Los Angeles County Parks Needs Assessment*

Technical Experience:

Software:
- *Arc GIS 8.x,*
- *Spatial Analyst,*
- *ArcInfo,*
- *AutoCAD*

Programming Languages:
- *Avenue, AML, VBA*

Database:
- *MS Access*

Mr. Charlton is a geographic information system (GIS) Analyst with over 14 years of experience in GIS and urban planning. Mr. Charlton's role at Sapphos Environmental, Inc. is to provide GIS support for the entire company in the form of GIS project development and management; GIS problem solving and spatial analysis with both vector and raster data; GIS data acquisition, conversion, maintenance, and documentation; cartographic production and design; application development; and database design and maintenance.

Projects Mr. Charlton has worked on at Sapphos Environmental, Inc. include the Southern California Association of Governments (SCAG) Land Use and Data Modeling Updates for the Malibu/Las Virgenes Sub-Region, the Los Angeles County Parks Needs Assessment and Facility Inventory, the 2003 Owens Valley PM10 Planning Area Demonstration of Attainment SIP Project EIR, Biological Monitoring and GIS analysis for the Cottonwood Wind Energy Project, and the Ahmanson Ranch Specific Plan.

Prior to joining Sapphos Environmental, Inc., Mr. Charlton worked for the Thurston Conservation District (District) located in Olympia, Washington, as a GIS specialist/system administrator. He was responsible for developing a robust and fully functional GIS for the District from the ground up. The GIS that Mr. Charlton developed is used for numerous conservation projects, for documenting the varied activities of the District, for special district tax assessment purposes, and for public outreach efforts. Additionally, Mr. Charlton developed a custom application for ArcView used for tax assessment purposes, and he created applications in ArcInfo for streamlining geoprocessing and data conversion tasks.

Prior to working at the Thurston Conservation District, Mr. Charlton worked for the City of Tumwater (City) in Tumwater, Washington, as an urban planner. While at the City, Mr. Charlton gained considerable experience in comprehensive planning. He was responsible for the revision of the City's comprehensive plan and zoning code.

Mr. Charlton has also worked for Riverside County in Riverside, California, as an urban planner. He developed skills in Specific Plans, the environmental review process, LAFCO annexation procedures, site plans, demographic analysis, and database development.

Prior to working at Riverside County, Mr. Charlton worked for the Earth Technology Corporation in San Bernardino, California, where he helped develop a spatial database of the United States railroad network. Mr. Charlton developed skills in research, inventory, and cataloging of multiple data sources, data development and attribution, and verification of data accuracy using aerial image interpretation.

Mr. Charlton began his GIS career at Aerial Information Systems in Redlands, California, after graduating from UC Riverside. While he was at Aerial Information Systems, he participated in field data collection for a Land Use and General Plan zoning consistency study for the City of Los Angeles. Data collected was used to create a spatial database in conjunction with Environmental Systems Research Institute (ESRI) in Redlands, California.

Caprice D. (Kip) Harper

MA, Anthropology (Archaeology emphasis), California State University, Los Angeles, 1997

Cultural Resource Analyst

- *Archaeological Survey and Excavation*
- *Section 106 Compliance*
- *Telecommunications Compliance*
- *NAHC and OHP Consultation*
- *Artifact Curation*

Years of Experience: 8

Relevant Experience:

- *Phase II Research Design for the Bartlett Point and Ash Point Air Quality Monitoring Stations, Owens Valley*
- *Phase I Archaeological Survey of the Bartlett Point and Ash Point Air Quality Monitoring Stations, Owens Valley*
- *Final Historic Resources Technical Report: Rettig Development Project, Sierra Madre, Califonia*
- *Assistant project manager for cultural resource assessments of more than 200 telecommunications facilities throughout Southern California and Clark County, Nevada*
- *Field director for San Nicolas Island GPS Mapping Project*
- *Directed cultural resource surveys of deteriorating power poles for Southern California Edison*
- *Compliance review of environmental documents for the California Energy Commission*
- *Curatorial Assistant for the Natural History Museum of Los Angeles County*
- *Archaeologist for the Stanislaus National Forest*

Ms. Caprice D. (Kip) Harper, cultural resource analyst, has over eight years of experience in California archaeology. During this period, Ms. Harper has acted as an assistant project manager, field director, crew chief, and curatorial assistant for environmental consulting firms, federal and state agencies, and museums.

Ms. Harper's experience spans the field of archaeology from archival research and field investigations to technical report preparation. This work typically involves consultation with various governmental agencies, including the Native American Heritage Commission (NAHC) and the State of California Office of Historic Preservation (OHP). During the past two years, Ms. Harper completed more than 200 Cultural Resource Assessments for various telecommunications carriers; this work was completed to fulfill the requirements of Section 106 of the National Historic Preservation Act (NHPA). Ms. Harper also work as an environmental planner (archeologist) reviewing functional equivalent environmental documents for the California Energy Commission.

Ms. Harper began her career conducting field investigations on San Nicolas Island, California, where she surveyed and recorded more than 360 archaeological sites using global positioning systems and participated on the excavation of several prehistoric archaeological sites; this work was funded by the U.S. Naval Air Weapons Station, Point Mugu. In addition, Ms. Harper has worked for the Natural History Museum of Los Angeles County as a curatorial assistant in the Anthropology Section and as a collections manager in the History Section, and as an archaeologist for the Stanislaus National Forest.

Ms. Harper is currently taking graduate course work in Historic Preservation at the University of California, Riverside. Ms. Harper is a Registered Professional Archaeologist and is a member of the Society for California Archaeology, the National Trust for Historic Preservation, the Archaeological Institute of America, and the Society of Architectural Historians. She is also an occasional volunteer for Pasadena Heritage.

Juliana Prosperi, MA

MA, Environmental Science and Energy Analysis, Boston University, Boston, Massachusetts

BA, Environmental Science and English, University of Colorado, Boulder, Colorado

Environmental Analyst IV

- *Participate in all aspects of the preparation of NEPA/CEQA documents*
- *Assist in conducting field surveys of sensitive animal and plant community resources*
- *Conduct and report on environmental research*
- *Serve as an active interdisciplinary group member*
- *GIS Analysis and Remote Sensing*
- *Statistical/Econometric Analysis using S-PLUS, SAS, and RATS*

Years of Experience: 4

Relevant Experience:

- *Assist in the preparation of several environmental documents.*

Ms. Juliana Prosperi, environmental analyst IV, joined Sapphos Environmental, Inc. after graduating from Boston University with a MA in Environmental and Energy Analysis through the department of Geography and the School of Public Health. She is currently participating in various projects at Sapphos Environmental, Inc. requiring technical and analytical skills, as well as field management. Ms. Prosperi's role at Sapphos Environmental, Inc. is balanced between preparation and coordination of environmental compliance documents such as Environmental Impact Reports, Mitigated Negative Declarations, Environmental Assessments, and Initial Studies, preparation of regulatory permits, as well as assisting in field monitoring and data collection.

Since joining Sapphos Environmental, Inc., Ms. Prosperi has had the opportunity to assist in the preparation of environmental documents which include the Long Beach Memorial Center Expansion Environmental Impact Report, the County of Los Angeles Fire Station 108 Environmental Impact Report, the Ranchos Los Amigos National Rehabilitation Center (RLANRC) North Campus Program Consolidation Project Draft Subsequent Environmental Impact Report, the Final EIR for South Coast County Golf Course, County of Kern Cottonwood Area Wind Energy Project, and several projects with Southgate Recreation and Park District.

Prior to working at Sapphos Environmental, Inc., Ms. Prosperi attended graduate school at Boston University located in Boston, Massachusetts where she received her Masters of Arts Degree in Environmental and Energy Analysis. During her studies, she worked part-time at the United States Environmental Protection Agency (USEPA) in the New England regional offices as a GIS Analyst with General Dynamics, assisting on numerous GIS and environmental health and policy related projects involving cases and remediation projects under the Clean Air Act (CAA), Clean Water Act (CWA), and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Before working at the EPA New England offices, she worked as an Environmental Associate at the EPA Region 5 offices in Chicago, Illinois. Here, she worked in the Superfund Division in several field GIS teams involving site remediation, human health risk assessment, and clean-up monitoring, using GIS and statistical programs.

Her studies included extensive coursework in environmental and natural resources economics and policy, multivariate statistics, GIS and spatial analysis, econometrics and energy modeling, human health and ecological risk and exposure assessment, toxicology, and environmental epidemiology. Her research projects included evaluating the effectiveness of state and federal pollution prevention programs (P2) and the benefits from reducing toxic use and byproduct at top polluting firms regulated under the Massachusetts Toxic Use Reduction Act (TURA), as well as measuring urban development along the Appalachian Trail using remote sensing and GIS analysis. She has had extensive experience in the environmental health sciences from both her specialized coursework taken Boston University's School of Public Health and projects she worked on at the EPA.

Laurie Solis, MA

MA, Anthropology/Archaeology
California State University
Northridge, 2004

MA, History
Canterbury University
Cheshire, U.K., 2003

Paleontology
Southern California
Pleistocene Marine
Pleistocene Terrestrial- Mammals
Miocene Marine

Cultural Resource Specialist

Years of Experience: 6

- *County of Los Angeles, Hollywood Bowl National Register of Historic Places Nomination Package*
- *Great Basin Unified Air Pollution Control District, Phase I & Phase II Archaeological Evaluation*
- *County of Los Angeles, Plaza de Cultura y Arte EIR – Cultural Resource Evaluation*
- *City of Sierra Madre – Historic Resource Evaluation*
- *Vasquez Rocks County Park - Phase I Archaeological Survey*
- *EnXco - Phase I Archaeological Survey*
- *County of Los Angeles Fire Station, Cultural Resource Evaluation*
- *City of LA, Bureau of Engineering – Archaeological Resource Evaluation*
- *Hyundai Corp. - Cultural Resource Evaluation*
- *LAUSD Central High School No. 9 – Cultural Resources Evaluation*
- *LAUSD Central High School No. 10 – Cultural Resources Evaluation*
- *SCAG 2000 RTP – Cultural Resources Evaluation*
- *Edwards Air Force Base – Archaeological Recognizance Survey and Excavation*
- *Vista Pacifica Project, in Culver City, CA-archaeological and paleontological monitoring*
- *City of Diamond Bar – archaeological/ paleontological monitoring*

Ms. Laurie Solis joined the Sapphos Environmental, Inc. team as a Cultural Resource Specialist in April 2003. She brings to Sapphos Environmental, Inc. five years of experience in management of cultural resources impact assessment projects throughout California. During her career, Ms. Solis has successfully completed numerous environmental studies pursuant to the California Environmental Quality Act (CEQA), the California Public Resources Code, the National Environmental Policy Act (NEPA), National Historic Preservation Act, Section 106. In addition, her experience includes preparation of complex technical studies and completion of environmental compliance documents for projects requiring incorporation of numerous technical studies and other input, occurring in various environments and habitat types, and facing multiple regulatory constraints.

Ms. Solis has managed and directed historic resource surveys, initial studies and investigations for the City of Sierra Madre, County of Los Angeles, Los Angeles Unified School District, and the City of Los Angeles, Bureau of Engineering for a number of projects, including Plaza de Cultura y Arte, 1 Carter Avenue, Fire Station No. 65, and Fire Station No. 63. She is currently completing the Hollywood Bowl National Register of Historic Places Nomination Package for the County of Los Angeles.

Her wide range of experience in archaeological and paleontological resource management includes directing archaeological and paleontological resource assessments, developing archaeological and paleontological mitigation treatment plans; performing field reconnaissance and surveys; conducting archaeological and paleontological monitoring and salvages; laboratory analysis and database management, literature review and research; and academic and technical report writing.

Ms. Solis' extensive experience in managing and directing Phase I archaeological resource surveys, as well as monitoring, were gained through her work for the City of Los Angeles, National Park Service, Edwards Air Force Base, and many private sector clients. Some of these projects include the Vasquez Rocks County Park, New Valley Bomb Squad Facility, and West Los Angeles Animal Shelter.

In addition, Ms. Solis has experience in the treatment of paleontological resources, which was gained through graduate coursework, and her internship at the George C. Page Museum in Los Angeles, where she was a laboratory assistant. Ms. Solis has collected fossil specimens as part of mitigation monitoring for projects at Edwards Air Force Base, City of Culver City, and the City of Diamond Bar. Her fossil recovery efforts for the City of Diamond Bar yielded the discovery of at least two new species of marine organisms never before discovered in California. These finds and others are currently being evaluated at the Natural History Museum of Los Angeles County and University of California at Berkeley.

Academically, Ms. Solis was awarded the 2001 Graduate Equity Fellowship Award in Archaeology and is an active member of the Society for California Archaeology, and Society for American Archaeology. She is a published author in academic journals on the topic of cultural resource law and practice in California.

Nuna Tersibashian, MS, REA

MS, Environmental Geology, California State University, Northridge

BS, Engineering Geology, State University of Yerevan, Armenia

Environmental Analyst III, Project Geologist, and Water Quality Specialist

Years of Experience: 7

Relevant Experience:

- *Conducted several groundwater investigations, assisting in the development of large hydrologic databases. Participated in updating Bulletin 118, Investigation of Southern California Groundwater Basins*
- *Conducted a hydrologic investigation of the Simi Valley, California to characterize runoff quality and quantity for the purpose of developing the watershed as a drinking water source*
- *Conducted landfill site investigations, surveys, and analyzed alternative environmental management policies for achieving environmental standards in a cost effective manner*
- *Interfaced with local regulatory agencies, gained approval for all investigation phases, and designed regulatory permits*
- *Produced geologic and hydrogeologic surveys of the sites and analyzed data. Prepared Quality Insurance Project Plans (QAPPs) and RI Reports*

Ms. Nuna Tersibashian, environmental analyst III, is currently participating in various projects at Sapphos Environmental, Inc. Ms. Tersibashian's role at Sapphos Environmental, Inc. is balanced between preparation and coordination of environmental compliance documents such as Environmental Impact Reports, Mitigated Negative Declarations, Environmental Assessments, and Initial Studies, preparation of regulatory permits, as well as assisting in field monitoring and data collection.

Since joining Sapphos Environmental, Inc., Ms. Tersibashian has had the opportunity to assist in the preparation of environmental documents, including the Brownfields Policy.

Prior to working at Sapphos Environmental, Inc., Ms. Tersibashian received her Masters of Science in Environmental Geology attended graduate school at the California State University located in Northridge, California where she. Her studies included surface water and groundwater impact analysis for Simi Valley, Ventura County, CA.

Ms. Tersibashian provided technical and management support to Edwards Air Force Base (EAFB) Environmental Restoration Program (ERP), Sites Remedial Investigations and Long Term Monitoring. She managed and performed extensive soil and groundwater sampling at the 50-acre area surrounding a former burn dump. A major component of the site work was the removal of debris ensuring no impact to the desert plant and wildlife species.

Ms. Tersibashian performed operation, maintenance and monitoring services for soil vapor extraction and treatment system, removing JP-8 from the soil around Hydrant 3 at EAFB.

Ms. Tersibashian conducted correspondence, presented data, and worked collaboratively with the Air Force, U.S. Environmental Protection Agency (EPA), Cal EPA, Regional Water Quality Control Board (RWQCB), and county agencies to gain approval of project plans, investigation alternatives, and schedules.

At EAFB, she also performed monitoring and reporting of key water quality indicators, and performed field and laboratory analysis of Simi Valley surface water. The water was analyzed for dissolved oxygen, pH, E. Coli and total coliforms, chlorophyll, alkalinity, metals, and nutrients. Analytical results were used by the Los Angeles RWQCB to develop a history of data for the classification of streams, ponds, and lakes.

Associations/Certifications/Achievements:

2002 Completed Toxic Chemical Training for Edwards Air Force Base, 8 hrs. 5-2002

2002 Current OSHA 8-hour Refresher Health & Safety Training

2001 OSHA 40-hour Health & Safety Training for Hazardous Materials Workers

1997 Member of American Society of Geologists

Appendix N

SCS Engineers
Résumés

ALLYSON L. BALUYOT

Education

B.A. - University of California, Irvine, 1999
Sociology (Additional coursework in Environmental Analysis and Design)

M.S. - University of San Francisco, 2004
Environmental Management

Additional Training

40-Hour Hazardous Waste Operations Training
8-Hour Annual Refresher Training for Hazardous Waste Site Activities
First-Aid and CPR Training

Affiliations

Society of Environmental Toxicology and Chemistry (SETAC), Southern California Chapter

Professional Experience

Ms. Baluyot has 3 years of experience in environmental consulting and preparation of human health risk assessments. She has performed and assisted in routine aspects of human health risk assessment, site characterization, and other environmental science projects, including baseline risk assessments, exposure modeling to predict exposure point chemical concentrations, development of action or cleanup levels, multi-pathway exposure assessments, development of site-specific, risk-based cleanup levels for soil and groundwater, and toxicological assessments. Her duties have included performing risk assessment calculations using spreadsheet tools and other modeling software, analyzing and interpreting environmental chemistry data, database management, and report writing. She has assisted in evaluating the nature and extent of contamination at hazardous waste sites; evaluating the fate and transport of chemicals in the environment; and preparing reports to document the site investigation process. In addition to completing health risk assessments at SCS, Ms. Baluyot has gained valuable experience in preparing air quality compliance reports, and performing field work activities such as indoor air methane monitoring and landfill gas probe monitoring. She joined SCS in September 2003.

Selected project experience includes the following:

- Active Commercial/Industrial Facility, San Diego, California (2001): Assisted in the preparation of a baseline risk assessment in support of a Resource Conservation and Recovery Act (RCRA) facility investigation for 26-acre site, including a technical memorandum and analysis of soil, groundwater, and soil gas data to determine chemicals of potential concern and evaluate the potential health risks to current and future on-site industrial workers and construction workers.

ALLYSON L. BALUYOT (continued)

- Former Industrial Facility, Los Angeles, California (2002): Prepared a human health risk assessment at a 3.75-acre site used by several different industries to evaluate the potential effects of constituents detected at the sites such as lead, residues from gasoline and diesel fuel, and other chemicals to a hypothetical commercial/industrial worker. A data usability study of historical data was conducted to address issues such as adequacy of samples and sampling methods with respect to potential sources.

- Former Agricultural Facility, Los Angeles, California (2003): Assisted in the preparation of human health risk assessment for former agricultural facility to determine risk to human health to potential future residents from chemicals formerly used at the site, including VOCs and pesticides.

- Former Chrome Plating Facility, Hayward, California (2003): Performed an environmental screening evaluation in support of investigations of trivalent and hexavalent chromium contamination in soil and groundwater beneath the facility. Representative soil and groundwater sample data were directly compared to environmental screening levels set forth by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) in their guidance document *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater (2004).*

- Former Precision Metal Stamping Facility, El Segundo, California (2003): Prepared a focused health risk assessment to evaluate potential human health risks to future site workers attributable to volatile organic compounds (VOCs) present in soil beneath the site.

- Landfill Located in San Diego County, California (2004): Assisted in the preparation of an air toxics human health risk assessment to determine risks from landfill gas to potential future residents adjacent to a landfill site.

- Commercial Fueling Facility, Petaluma, California (2004): Prepared focused health risk assessment to estimate potential future health risks to future construction and commercial/industrial workers at site from total petroleum hydrocarbons and "indicator chemicals" for petroleum mixtures such as VOCs and polycyclic aromatic hydrocarbons (PAHs). A "tiered" approach was used using SFBRWQCB's *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater (2004).* Cleanup levels were also determined based on the evaluation of risk.

- Former Commercial/Industrial Facility, Menlo Park, California (2004): Prepared health risk assessment in support of a RCRA facility investigation to evaluate potential health risks to current/future on-site and off-site receptors at a former facility involved in the aerospace, automotive, construction, electronics, electrical power, process and telecommunications industries.

PAUL DAMIAN, Ph.D., MPH, DABT

Education

B.S. - University of Michigan, 1981
Natural Resources

MPH (Master of Public Health) - University of Michigan, 1984
Environmental Health

Ph.D. - University of California, Davis, 1995
Toxicology and Pharmacology

Certifications

Diplomate, American Board of Toxicology (DABT), 1997 (Recertified 2003)

Affiliations

Society of Toxicology
American College of Toxicology
Society of Environmental Toxicology and Chemistry
International Society of Regulatory Toxicology and Pharmacology
Roundtable of Toxicology Consultants
Society for Risk Analysis
Health Physics Society
American Bar Association (Environment, Energy and Resources Section) (Associate Member)
Groundwater Resources Association of California

Professional Experience

Dr. Damian is a Board Certified Toxicologist with 20 years of experience assessing the human health and ecological risks associated with chemical contamination of the environment and workplace. He is the California Risk Assessment Practice Leader and National Partner for Risk Assessment at SCS.

Dr. Damian's project experience has included directing and preparing risk assessments and risk assessment work plans for hazardous waste sites, military bases, mine and smelter sites, radiation sites, landfills, and brownfields. His experience also includes Proposition 65 compliance, chemical and drug product safety assessment, contaminated building risk assessments, and expert witness testimony. Dr. Damian brings advanced risk assessment expertise to our clients, including Monte Carlo (probabilistic) risk assessment and toxicokinetic modeling. Dr. Damian has been trained at Argonne National Laboratory in the use of RESRAD, the leading computer model for assessing risks associated with radioactively contaminated sites.

PAUL DAMIAN, Ph.D., MPH, DABT (continued)

Prior to joining SCS, Dr. Damian was involved in the following projects:

- As Principal of Chemical Risk Sciences International, he conducted advanced risk assessment and environmental toxicology projects for private and public sector clients.

- As Principal Toxicologist/Risk Assessment Scientist for Tetra Tech EM, Inc., he was project manager on risk assessment and toxicology projects. He provided senior-level toxicology and health risk assessment support to other project managers throughout the company and contributed advanced risk assessment methods such as pharmacokinetic/toxicokinetic analysis and probabilistic (Monte Carlo simulation) risk assessment capabilities.

- As Principal Toxicologist/Risk Assessment Scientist at Earth Tech, Inc. (formerly Rust Environment & Infrastructure), Dr. Damian was project manager on risk assessment and toxicology projects. He provided senior-level toxicology and health risk assessment support to other project managers throughout the company and contributed advanced risk assessment methods such as pharmacokinetic/toxicokinetic analysis and probabilistic (Monte Carlo simulation) risk assessment capabilities.

- As Regional Program Coordinator for the Food Animal Residue Avoidance Databank, Department of Environmental Toxicology, University of California, Davis, he supervised staff in the conduct of pharmacokinetic analyses, responded to information requests from veterinarians, and managed day-to-day operations. He advised public officials on the public health implications of food animal poisonings, and advised veterinarians on the extra-label use of drugs in order to prevent the occurrence of drug residues in meat and milk. He also performed pharmacokinetic analyses of drugs and chemicals in food animals.

- As Senior Toxicologist for Delta Environmental Consultants, Inc., in Rancho Cordova, California, he provided senior-level toxicology and health risk assessment support for the investigation and remediation of underground petroleum storage tank sites, pre-purchase site assessments, and hazardous waste site cleanups.

- As Lead Toxicologist for Hazardous Waste/Toxicology Group at Envirosphere in Sacramento, California, he was responsible for all technical activities associated with health risk assessment/toxicology work. He was Lead Risk Assessor for a multipathway health risk assessment for a Superfund site in San Jose, California, and assessed health impacts associated with catastrophic and routine releases of toxic air contaminants.

- As a toxicologist in the Risk Assessment and Toxicology Group at Radian Corporation in Sacramento, California, he prepared air toxics health risk assessments for waste-to-energy incineration facilities and hospital incinerators. He also assisted in the development and/or selection of appropriate health risk assessment methods, and

PAUL DAMIAN, Ph.D., MPH, DABT (continued)

developed acceptable levels of exposure to toxic chemicals based on critical reviews and interpretation of the toxicological literature.

- As a toxicologist for the Toxics Group, Standards and Toxics Section, Ohio Environmental Protection Agency, he prepared statewide technical guidelines for use in developing surface water quality standards for toxic chemicals. The guidelines provided detailed procedures for the consistent interpretation of mammalian toxicology data and were approved by U.S. EPA. Dr. Damian assisted in setting up a technical advisory group to review the guidelines, and provided general toxicology support on agency projects.

- As a toxicologist for the Hazard Assessment Unit, Toxic Chemical Evaluation Section, Michigan Department of Natural Resources (Lansing, Michigan), he reviewed, evaluated, and compiled data from the primary scientific literature dealing with the toxicological properties of chemicals. He conducted reviews of the aquatic and mammalian toxicology literature to evaluate potential impacts of toxic substances, and to provide justification and rationale for water quality standards.

Dr. Damian's specific project experience includes:

- Prepared baseline human health and ecological risk assessments for a landfill site in southern California. The assessments evaluated potential risks associated with metals, explosives, dioxins and furans, polynuclear aromatic hydrocarbons (PAHs), VOCs, and pesticides. The risk assessments were approved by the California Department of Toxic Substances Control (DTSC).

- Wrote the draft basewide human health risk assessment protocol document for the U.S. Navy for the former Alameda Point Naval Air Station, Alameda, California. Arranged meetings with the U.S. Navy, California DTSC and U.S. EPA Region 9, and led negotiations regarding development of the basewide human health risk assessment protocol document.

- Wrote a health and ecological risk assessment work plan for a 1,000-acre brownfields site in southern California. The work plan was approved by the California DTSC.

- Project manager for a Removal Action Work Plan (RAW) and Site Remediation Completion Report (SRCR) for a 100-acre explosives site in northern California. The California DTSC approved the RAW and SRCR, and the site was certified closed.

- Prepared a health risk assessment for a former scrap metal recycling site in Tempi, Arizona consistent with Arizona Department of Health Services (DHS) risk assessment guidelines. The assessment included both deterministic and probabilistic (Monte Carlo) assessment of health risks associated with residual arsenic, lead, and PCBs in soil. The

PAUL DAMIAN, Ph.D., MPH, DABT (continued)

Monte Carlo assessment resulted in an estimated savings of about $1.5 million in cleanup costs for the client.

- Prepared a Monte Carlo (probabilistic) risk assessment for a chemical widely used in the semiconductor industry. The assessment resulted in an estimated savings of $15 million in retooling costs for a major semiconductor manufacturer.

- Project manager for a human health risk assessment for a 100-acre brownfields site in northern California. An explosives-manufacturing company formerly owned the site and the site was contaminated with explosives and metals.

- Prepared a groundwater vapor intrusion risk assessment for a UST site owned by a national manufacturer of luggage. The risk assessment resulted in closure of the site within 3 months.

- Prepared a data usability memorandum to support baseline human health and ecological risk assessments for a landfill site in southern California. The data usability memorandum was approved by the DTSC.

- Prepared a radiological hazard assessment for a former uranium mine in Stanislaus County, California. The assessment evaluated the immediate health hazards associated with gamma radiation, radon exposure, consumption of radionuclide-contaminated drinking water and soil, and potential contamination of beef cattle with radionuclides. The project involved the use of RESRAD and direct measurement of gamma emissions, radon concentrations in ambient air, and airborne particulate concentrations of radionuclides to assess radiation dosages for recreational users of the site. Also developed human health and ecological screening benchmarks for acceptable levels of radionuclides in soils, surface water and sediments.

- Prepared a health risk assessment for a former mine facility site near Morenci, Arizona, consistent with Arizona DHS risk assessment guidelines. The assessment evaluated health risks associated with residual soil levels of arsenic. The following exposure pathways were evaluated: soil ingestion, inhalation of soil particulates, and dermal contact with soil. The assessment concluded that health risks to a hypothetical occupational population would be negligible.

- Prepared a health risk assessment for a former mine tailings disposal site near Clifton, Arizona, consistent with Arizona DHS risk assessment guidelines. The assessment evaluated health risks associated with residual soil levels of arsenic and copper following site remediation. The following exposure pathways were evaluated: soil ingestion, inhalation of soil particulates, and dermal contact with soil. The assessment concluded that health risks to hypothetical residential, occupational, and student population receptors would be negligible.

PAUL DAMIAN, Ph.D., MPH, DABT (continued)

- Project Manager for several baseline multi-pathway human health and ecological risk assessments for a 1,000-acre former propellant-manufacturing site in southern California.

- Prepared a human health and ecological endangerment assessment for two mine sites in Uinta National Forest, Utah County, Utah (Dutchman Flats and Pacific Mine). The endangerment assessment included evaluating human health and ecological risks and developing arsenic and lead cleanup levels to protect a hypothetical recreational user of the site.

- Prepared a product safety health risk assessment for a mine-derived national lawn care product. The assessment included management of a contract toxicology laboratory, geochemical characterization of the chemical forms of mine-derived lead and arsenic, and *in vitro* bioavailability studies of lead and arsenic.

- Assisted in the evaluation of the potential health risks associated with toxic emissions from a proposed 800-ton/day solid waste combustion facility to be located in Stanislaus County. Toxic contaminants evaluated in this assessment included heavy metals, PCBs, PAHs, polychlorinated dibenzodioxins, and dibenzofurans. All potentially significant exposure pathways were evaluated, including inhalation, drinking water, fish consumption, inadvertent ingestion of soil, dermal contact with soil, and consumption of contaminated food (produce, dairy products and meat). The assessment included quantitative estimation of cancer and noncancer risks to impacted receptor populations, including sensitive receptor populations located at schools and hospitals. The risk assessment was reviewed and approved by both the California Air Resources Board and the California Department of Health Services.

- Assisted in the preparation of a multi-pathway health risk assessment for the Milliken waste-to-energy facility, a 1,600-ton/day solid waste combustion facility proposed for construction in San Bernardino County, California. The assessment included estimation of human contaminant exposures and risks for the following exposure pathways: inhalation, dermal contact with soil, drinking water, fish consumption, soil ingestion, and maternal milk consumption.

- Prepared a screening-level analysis of the projected maximum health impacts associated with inhalation exposure to plutonium-239 (Pu-239) released during truck transport of low-level transuranic radiologic waste. Plutonium present in a hypothetical waste payload was assumed to be released via a fire resulting from a truck accident. Maximum downwind air concentrations of the released plutonium were modeled using the EPA- and California Air Resources Board-approved air dispersion models PTPLU and PTFUM. The dispersion modeling approach used included consideration of the effect of combustion gas production on the plutonium release rate. Lifetime cancer risk and the potential for noncancer-related acute toxic effects were determined based on inhalation

PAUL DAMIAN, Ph.D., MPH, DABT (continued)

exposure. Inhalation exposure included contributions from direct inhalation of ambient air and inhalation of resuspended particulates.

- Assessed the health impacts associated with air emissions from a hotel incinerator. Population exposures to metal and organic contaminants were estimated for the following exposure pathways: inhalation, dermal contact with soil, inadvertent soil ingestion, drinking water, home garden produce consumption, and maternal milk. Lifetime cancer risks and the potential for noncancer adverse health effects were evaluated. The risk assessment was submitted to the County of Santa Barbara Air Pollution Control District.

- Technical lead responsible for the evaluation of public and worker health impacts associated with production and testing of a newly designed rocket motor for the Space Shuttle. The evaluation included the assessment of impacts related to hazardous material spills, rocket motor explosions and fires, and inhalation exposure to rocket exhaust during testing. A detailed discussion of general worker health and safety practices and control technologies associated with rocket motor production was also prepared as part of the evaluation.

- Risk assessment lead for a comprehensive Superfund site public health evaluation for a hazardous waste drum recycling facility located in San Jose, California. Numerous exposure pathways were evaluated including: inhalation, soil ingestion, dermal contact with soil, fish consumption, dermal contact with sediment, sediment ingestion, drinking water, indoor air exposure through domestic use of groundwater, and home garden produce consumption.

- Assessed the health effects associated with chemicals released from a proposed University of California research laboratory. The assessment included evaluating toxicology data to develop estimates of safe exposure levels for approximately 50 chemicals used at the research laboratory.

- Prepared a health risk assessment of a fertilizer product to support compliance with California's Proposition 65. The assessment was prepared consistent with the requirements of Proposition 65, and included evaluation of exposure occurring through incidental soil ingestion, inhalation of airborne particulates, dermal contact and consumption of homegrown garden produce.

- Evaluated the health risks associated with potential human exposure to DDT in soil as part of a real estate site audit. Total daily exposure to low levels of DDT in soil was estimated for the following pathways: inhalation, inadvertent soil ingestion, and dermal contact with soil. The risk assessment was conducted according to California Proposition 65 risk assessment guidelines to determine whether the site was in compliance with the Proposition 65 "no significant risk" level for DDT.

PAUL DAMIAN, Ph.D., MPH, DABT (continued)

- Provided third-party critical review of a comprehensive hazardous waste disposal facility risk assessment for the County of Santa Barbara.
- Prepared and/or reviewed and approved health and safety plans for the investigation and remediation of leaking underground storage tank sites.
- Evaluated the potential health impacts associated with catastrophic release of propane from a propane tank rupture. The evaluation included modeling of the air dispersion of the released propane.
- Evaluated the potential health risks for a building contaminated with lead.
- Prepared a literature review of the toxicity of lead and arsenic to horses.
- Prepared and presented expert witness testimony with regard to the potential public health impacts associated with placement of a large cogeneration facility in Crockett, California. Testimony addressed the health significance of routine air emissions, as well as possible catastrophic release of ammonia in the event of an accidental ammonia tank spill or rupture (deposition and testimony at administrative trial). Provided expert witness testimony regarding the human health risks associated with possible toxic contamination of a herd of beef cattle (deposition and testimony at juried trial).
- Prepared and presented expert witness testimony with regard to the potential public health impacts associated with the diversion of water from the Sacramento Delta upstream into the Camanche Reservoir. Testimony addressed the possible contamination of Camanche reservoir fish with contaminants from lower quality delta water and resulting human exposure through fish consumption (deposition and testimony at administrative trial).

In addition, Dr. Damian serves on the Editorial Board, TOMES (Toxicology, Occupational Medicine, and Environmental Series) Information System, Micromedex, Inc., Englewood, Colorado, and developed and taught a graduate course (Toxicokinetics and Pharmacokinetics) as an Adjunct Assistant Professor in the Department of Pharmaceutical Sciences, School of Pharmacy, University of Colorado Health Sciences Center.

Continuing Education/Special Training

Investigation and Remediation of Dry Cleaner Release Sites. Groundwater Resources Association of California Symposium. Newport Beach, California. November 10, 2004.

Investigation and Remediation of Dry Cleaner Release Sites. Groundwater Resources Association of California Symposium. Sacramento, California. April 7, 2004.

33rd Annual Conference on Environmental Law. American Bar Association. Keystone, Colorado. March 11-14, 2004.

PAUL DAMIAN, Ph.D., MPH, DABT (continued)

1,4-Dioxane & Other Solvent Stabilizer Compounds in the Environment. Groundwater Resources Association of California Symposium. San Jose, California. December 10, 2003.

Emergent Chemicals: Who, What, When, Where and How to Clean Up. Groundwater Resources Association of California Symposium. Irvine, California. October 9, 2003.

Subsurface Vapor Intrusion to Indoor Air: When is Soil and Groundwater Contamination an Indoor Air Issue? Groundwater Resources Association of California Symposium. San Jose, California. September 30, 2003.

Environmental Risk Insurance. Pacific Business and Industrial Association. Palo Alto, California. September 18, 2003.

Perchlorate in Groundwater: Occurrence, Analysis and Treatment. Groundwater Resources Association of California Symposium. Sacramento, California. July 31, 2003.

Fundamentals of Risk Assessment and Applications of Recent Methodologies to Difficult Problems, Society of Toxicology Continuing Education Course, Society of Toxicology 42nd Annual Meeting, Salt Lake City, Utah, March 9, 2003.

Risk Assessment for Metals, Society of Toxicology Continuing Education Course, Society of Toxicology 40th Annual Meeting, San Francisco, California, March 25, 2001.

RESRAD Training Workshop, Argonne National Laboratory, Argonne, Illinois, January 29-30, 2001.

Practical Issues in the Use of Probabilistic Risk Assessment and Its Application to Hazardous Waste Sites, Superfund Basic Research Program and the University of Florida, Sarasota, Florida, March 29-31, 1998.

Effective Risk Communication: Avoiding the Pitfalls, Society of Toxicology Continuing Education Course, Society of Toxicology 37th Annual Meeting, Seattle, Washington, March 1, 1998.

Bioavailability: Quantifying the Real Toxicity of Common Soil Contaminants, International Business Communications, Scottsdale, Arizona, December 11-12, 1997.

Quantitative Uncertainty Analysis in Risk Assessment: Monte Carlo Techniques, Society of Toxicology Continuing Education Course, Society of Toxicology 35th Annual Meeting, Anaheim, California, March 10, 1996.

International Workshop on Physiologically-Based Pharmacokinetic Modeling and Risk Assessment, Colorado State University, Ft. Collins, Colorado, August 3-21, 1992.

PAUL DAMIAN, Ph.D., MPH, DABT (continued)

Publications

Damian, P., and Pontius, F. From Rockets to Remediation: The Problem of Perchlorate in Drinking Water. Environmental Protection June 1999.

Damian, P., Craigmill, A., and Riviere, J. 1997. Farad Digest: Breaking new ground. Journal of the American Veterinary Medical Association 210(5).

Craigmill A.L., Rangel-Lugo M., Damian P., and Riviere J. E. 1997. Extralabel use of tranquilizers and general anesthetics. Journal of the American Veterinary Medical Association 211:302-304.

Damian P., Craigmill A.L., and Riviere J.E. 1997. Extralabel use of nonsteroidal anti-inflammatory drugs. Journal of the American Veterinary Medical Association 211:860-861.

Damian, P., and Raabe, O.G. 1996. Toxicokinetic modeling of dose-dependent formate elimination in the rat: in vivo-in vitro correlations using the perfused rat liver. Toxicology and Applied Pharmacology 139:22-32.

Presentations

"Using Risk Assessment to Streamline Contaminated Site Closure," Presented at the February 13, 2001, Meeting of the Colorado Hazardous Waste Management Society, Denver, Colorado.

"Using Risk Assessment to Facilitate Contaminated Site Closure," Presented at the January 13, 2000, Meeting of the Rocky Mountain Association of Environmental Professionals, Denver, Colorado.

"Using Risk Assessment to Facilitate Contaminated Site Closure," Presented at the March 16, 2000, Meeting of the American Society of Civil Engineers, Denver, Colorado.

RAYMOND H. HUFF, R.E.A.

Education

B.A. - Whittier College, 1991
Philosophy (Minor in Geology)

M.B.A. - Keller Graduate School of Management, 1999
Information Systems Emphasis

Licenses, Certifications, and Affiliations

Registered Environmental Assessor - California, 1997 (No. 06857)
OSHA 40-Hour Health and Safety Training for Hazardous Waste Workers
OSHA 8-Hour Hazardous Waste Supervisor Training

Professional Experience

Mr. Huff has over 13 years of experience in the field of environmental consulting, information systems management, and in the areas of environmental site assessment and remediation, chemical fate and transport modeling, and risk assessment. He is currently a Project Manager in SCS's California office. Mr. Huff has been the task manager and lead staff personnel on a variety of projects relating to site investigation, risk assessment, environmental modeling, and risk management of sites with both soil and groundwater contamination.

Selected projects and studies Mr. Huff has participated in include the following:

- Environmental Investigations and Risk Assessment at a former landfill in Los Angeles County. This landfill is a closed site that may have received both hazardous and non-hazardous wastes; it is currently occupied by two golf courses and other commercial and residential developments and is being considered for additional redevelopment. Project work at this facility has included completion of soil vapor surveys, installation and monitoring of LFG migration probes, LFG sampling/analysis, oversight of cover and subsurface soil and groundwater sampling, completion of a human health risk assessment, CEQA assistance, and negotiations with regulatory agencies. The site is currently being considered for listing on the National Priorities List (NPL) as a potential Superfund site. Oversight of the landfill is provided by EPA Region IX, DTSC, and the Los Angeles County landfill LEA.

- Creation of Baseline Human Health and Ecological Risk Assessment for a former rocket manufacturing facility in Van Nuys, California, which is undergoing site mitigation under RCRA. Contaminants at the site include heavy metals, pesticides, PCBs, hydrazine, and VOCs. The ecological risk assessment included terrestrial ecosystems.

- Key field geologist in the investigation of a former oil refinery located in central California. In addition to conducting remedial excavations of lead impacted soils, Mr.

RAYMOND H. HUFF, R.E.A. (continued)

Huff planned, scheduled, and coordinated quarterly sampling of 73 multi-aquifer groundwater monitoring wells located in and around the site, as well as designed and installed 16 groundwater monitoring wells located in three different aquifers for contaminant plume tracking and remediation; and compiled data and prepared reports for submittal to regulatory agency.

- Creation of Baseline Human Health and Ecological Risk Assessment for a former electronics manufacturing facility in Los Angeles, California. Contaminants at the site included chlorinated solvents. The ecological risk assessment included terrestrial ecosystems.

- Human Health Risk Evaluation and Impact Assessment for proposed commercial developments, on and adjacent to a former hazardous waste landfill in southern California. The site contains two landfills; one municipal solid waste landfill and one hazardous waste site, which are under the oversight of DTSC. Mr. Huff completed various investigations and data reviews/analyses of soil, surface water, groundwater, LFG, and air quality. The data were used for the completion of a human health risk assessment in support of the CEQA process for a proposed golf course and business park development on the Class III landfill.

- Key field geologist in remedial oversight for cleanup of a former petroleum refinery and state Superfund site located in Southern California. More than 1,000,000 cubic yards of contaminated soils were excavated for on-site treatment using bioremediation and vapor extraction.

- Investigation, Risk Assessment, and Remediation Feasibility Study for a former landfill in San Diego County, California. For this site, Mr. Huff developed the LFG sampling portion of the site assessment workplan of the former landfill site, which is located next to a river, bay, and amusement park and is used heavily for recreational purposes. The field investigations will be followed by a risk assessment, and given the highly visible and public nature of the landfill project; focus on risk communication will be of primary importance. Ultimately, several candidate risk-based remediation methods applicable to the site will be identified with typical costs associated with each method. This is an ongoing project that includes interface with multiple regulatory agencies. Site investigative activities, including preparation of work plans, conducting soil gas surveys, installation of soil borings and subsequent sampling, and evaluation of applicable remedial alternatives, assessment of hydrocarbon contaminant plumes from a variety of sources, including leaking underground storage tanks, aerospace facilities, and former petroleum refineries.

- In-field design and installation of vapor extraction systems for the remediation of volatile contaminants in subsurface soils.

RAYMOND H. HUFF, R.E.A. (continued)

- Planning and direction of field investigations of numerous hazardous waste sites to identify and characterize contaminants in soil and groundwater.

- Preparation of health and safety plans submitted for regulatory approval. This includes hazardous waste characterizations, emergency response planning, establishing site operating procedures, and field implementation of health and safety plans.

- Preconveyance environmental assessments of properties prior to real estate transfer. These projects consist of evaluating past on-site operations, identifying potentially contaminated sites, record searches of files maintained by regulatory agencies, and collection and analysis of groundwater quality information, where applicable.

Additionally, Mr. Huff is skilled in information systems management, database design, programming, and computer modeling. He is responsible for the collection, conversion, manipulation, and management of data used in risk assessments, groundwater and vadose zone migration, water fate and transport modeling, and in designing and developing maps, cross-sections, and 3-D visualizations of surface and subsurface environments.

Mr. Huff is also experienced in database design, development, programming, and management. Project experience includes adaptation of soil contaminant attenuation models, and creation/management of GIS database used for tracking and administration of internal SCS projects. Mr. Huff's expertise includes the use of the EPA-approved SESOIL and VLEACH (vadose zone), AT123D and MODFLOW (groundwater), Visual MODFLOW, Visual Groundwater, MS Project, AutoCAD, GIS (ArcInfo/ARCView), Surfer, Visual Basic, FileMaker Pro, MS Access, Dbase, and MS Windows 3.1/NT/95/98, Unix, and Apple Macintosh operating systems and applications.

Mr. Huff also performs project and financial management for internal and external projects using business practices and project management skills acquired during completion of his Master's degree in Business Administration.

Mr. Huff has participated in a certified health and safety program in compliance with OSHA Standard 29 CFR 1910.120. He is knowledgeable in incident response operations, team functions, personnel safety, and field equipment. Mr. Huff has also participated in an OSHA-approved Hazardous Waste Supervisor Training course.

Prior to joining SCS, Mr. Huff was affiliated with Green & Associates, an environmental consulting firm that provided services such as Phase I assessments, asbestos assessments, and evaluation of core samples for paleontological purposes for major oil companies.

Publications and Presentations

Huff, Raymond; Leonard, Michelle; and Sullivan, Patrick S., Composting Emissions Update and New Southern California Regulations, Presentation at the Annual Solid Waste

RAYMOND H. HUFF, R.E.A. (continued)

Association of North America (SWANA) WASTECON Conference in St. Louis, Missouri, October 2003.

Huff, Raymond, and Sullivan, Patrick S., Unique Landfill Gas Issues on Urban Inactive Landfills, Conference Proceedings, 27th Annual Solid Waste Association of North America (SWANA), Landfill Gas Symposium in San Antonio, Texas, March 2004.

Huff, Raymond, and Sullivan, Patrick S., Air Quality and Odor Impacts from Landfill-Related Emissions, Conference Proceedings, Water Environment (WEF) and Air and Waste Management Association (AWMA) Odor and Air Emissions 2004, Bellevue, Washington, April 2004.

KENNETH H. LISTER, Ph.D., C.E.G., C.H.G.

Education

B.S. - University of California, Los Angeles, 1967
Geology

M.S. - University of California, Los Angeles, 1970
Geology

Ph.D. - University of Kansas, Lawrence, 1974
Geology

Professional Licenses

Professional Geologist - California, 1987 (No. 4338)
Certified Engineering Geologist - California, 1991 (No. 1581)
Certified Hydrogeologist - California, 1995 (No. 79)
Registered Geologist - Arizona, 1989 (No. 23684)
Certified Petroleum Geologist - AAPG, 1986 (No. 2977)

Affiliations

American Association of Petroleum Geologists (Environmental Issues Committee)
Geological Society of America (Hydrogeology and Engineering Geology Divisions)
National Water Well Association
American Society of Testing and Materials (Committee on Environmental Assessment)

Professional Experience

Dr. Lister has 30 years of professional experience in geology and hydrogeology. His experience includes remedial investigations at active and inactive industrial facilities; active, inactive, and planned solid waste disposal sites; and state and federal Superfund sites. Dr. Lister has participated in numerous types of projects, including the following:

- Investigation of vadose and saturated zone contamination at industrial and commercial sites throughout Southern California, including Remedial Investigations (RI) and Feasibility Studies (FS).

- Investigations of surface and groundwater quality at landfills, including design of groundwater monitoring systems, direction of well drilling and installation, sampling and analysis, interpretation of data, and preparation of reports.

- Design of groundwater and vadose zone treatment systems, including determination of subsurface properties by means of aquifer pump tests, vapor extraction tests, and laboratory tests; determination of well location and spacing by means of capture zone analysis; preparation of remedial action plans, including specifications for extraction and air sparging wells; and determination of operations, maintenance, and test programs.

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- Studies of proposed sites for new landfills and other waste management facilities, including hydrogeological assessments of sites for protection of water quality. Work included installation of monitoring wells, groundwater sampling on a local and regional basis, conducting aquifer tests, and descriptions of groundwater regimes for environmental evaluation and permitting.

- Research into field investigation and remediation, resulting in journal articles, reports, and guidance documents on the practical application of these techniques.

- Investigation of groundwater flow patterns in relation to migration of hydrocarbons, including regional subsurface studies of variations in permeability and porosity, potential migration pathways, and geochemical and geophysical indications of migration.

- Litigation support, including research and report preparation, advising legal counsel, and expert testimony.

Selected projects in which Dr. Lister has been involved at SCS include the following:

- Project Manager for site investigation and remediation for a dry cleaning facility located in a regional shopping center in Goleta. Tetrachloroethene and its breakdown products have been found in soil, soil vapor, and groundwater samples. Investigative effort has concentrated on determining extent of impacts to multiple groundwater zones and feasible remediation approaches. Vadose zone remediation testing has involved injection of chemicals designed to promote reduction dechlorination within the aquifer.

- Project Manager for multiple former underground storage tank sites in the Los Angeles area for a large dairy. Vadose zone soils and groundwater have been impacted. Groundwater monitoring wells have been installed and monitored. Vadose zone wells have been installed and soil vapor extraction tested. Design and remediation efforts will involve installation and operation of vapor extraction systems and free product recovery.

- Project Manager for site investigation on four parcels (total of approximately 67 acres) of a large industrial site in Downey. This 160-acre former aerospace manufacturing facility was active from the late 1920s to the present. Investigation involved review of extensive files, design of a soil vapor and bulk soil sampling and analysis program, conducting the field work, and preparation of reports. Expedited implementation of the investigation allowed on-schedule redevelopment of the parcels in question by the City of Downey. Substances tested included solvents, fuel hydrocarbons, and trace metals.

- Project Manager for investigation and remedial action planning for an approximately 15-acre area in Santa Barbara, involving three dry cleaning facilities, a former vehicle maintenance area, and several thousand feet of sewer main. The project has included soil and groundwater sampling and analysis, aquifer testing, fault studies, and document preparation.

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- Project Manager for remedial investigation, design, and construction for a pesticide-impacted site located on a portion of the Thermal Airport, Riverside County, California. Soil sampling and analysis and health risk assessment were used to delineate the areas requiring remedial action. Design and construction, conducted under Regional Water Quality Control Board (RWQCB) oversight, involved a composite soil/synthetic membrane cap and other facilities to isolate affected soil from potential receptors. Construction was carried out on a rapid turnaround basis, with SCS acting as the general contractor.

- Project Manager for remedial action for Kaiser Ventures facilities. For the former Kaiser Steel plant in Fontana, a two-phase remedial investigation has been carried out and the final report accepted by the California State Environmental Protection Agency, Department of Toxic Substances Control (DTSC). Portions of the site were found to contain soils impacted by coal tar components and heavy metals. Residual materials from coke making and iron and steel manufacturing also exist on site. Feasibility studies and remedial action plans were completed and approved for two of three major portions of this 1,100-acre facility. Remedial action on the largest operable (approximately 500 acres) was completed on a rapid turn-around basis in 1995, and was approved by the DTSC. This portion of the site was redeveloped into an automobile race track. Dr. Lister was also responsible for a number of individual soil, ground-water, and waste investigations, including treatability studies, risk assessments, remedial action plans, preliminary endangerment assessments, and hydrogeological studies. Investigations and remedial action at other Kaiser facilities, including an iron mine, have been conducted.

- Project Manager for RCRA closure at a former aerospace manufacturing facility in Van Nuys, California. Closure plan implementation consisted of investigation of nine waste treatment or storage facilities on a 54-acre site. Site-wide investigation was also conducted including soil vapor survey, soil sampling to 130 feet, groundwater monitoring, and remedial action planning. Remedial activities have included design and implementation of soil vapor extraction, lead removal from a former shooting range, and asbestos removal.

- Project Manager for an RCRA facility assessment (RFA) at a former pesticide storage and disposal site in Pico Rivera, California. County-owned site was used for rodent and other bait formulation for over 60 years, including use of strychnine, thallium compounds, warfarin, and other poisons. The site was also used for collection, storage of dry materials, and tank disposal of waste liquid pesticides received from the public. Based on review of historical sources, a list of over 200 pesticides received on site was compiled. RFA activities have included soil sampling, groundwater well construction and sampling, sample analysis, removal actions, and closure of a septic system used for disposal of pesticide container rinsings.

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- Project Manager for remedial action and hydrogeological studies in support of closure for a former oil production facility in Los Angeles. This site, located on a public beach, was subject to excavation of impacted soil, installation and monitoring of groundwater and vapor wells, and a natural attenuation study.

- Project Manager for investigation of impacts to groundwater from degreasing operations at a 7-acre industrial site in Gardena. Several chlorinated hydrocarbon species have been detected, some of which have their source in off-site areas.

- Project Manager for remedial investigation and feasibility study at the operating Angeles Chemical facility in Santa Fe Springs, including RI/FS and removal actions carried out under DTSC oversight. Project included test, permitting, and installation of a vapor extraction system designed to remove a mixture of as many as 12 volatile solvents from the vadose zone, and simultaneously treat vapor from industrial activities at the site.

- Project Manager for the hydrogeological assessment of the former Armco Steel site in Torrance, California. Project consisted of ground water monitoring well installation, sampling, and analysis and interpretation in terms of local and regional hydrogeology. There are 23 on-site wells, and 12 off-site wells are planned.

- Project Manager for remedial investigation and remediation for a site located in the Puente Valley Well Investigation Program (part of the San Gabriel Valley Superfund site). Multiple phases of soil, soil vapor, and groundwater sampling have occurred, due to impacts by chlorinated hydrocarbons. A soil vapor extraction system was designed, installed, and was operated until site closure was received.

- Project Manager for groundwater monitoring system design and permit compliance for a drinking water treatment sludge monofill for the Peck Road Gravel Pit/San Marino Landfill in Monrovia and Irwindale, California.

- Project Manager for closure, including design of groundwater monitoring systems at several waste management units in California, including the North Chollas Landfill in San Diego, Maxson Street Landfill in Oceanside, the Kaiser Tailings Ponds in Riverside County, and Duck Pond Landfill in National City.

- Project Manager for Water Quality Solid Waste Assessment Test (SWAT) investigations in California, including a Ford Motor Company truck storage site in Carson, the Kaiser East Slag Pile Landfill in Fontana, Peck Road Gravel Pit in Monrovia, Berkeley City Landfill, and others.

- Task Manager for groundwater monitoring and vapor extraction system operation at a former electronics manufacturing facility in Los Angeles, impacted by chlorinated hydrocarbons. Project involved leading a major post-remediation environmental

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evaluation involving soil and soil vapor sampling and analysis. Dr. Lister has been designated an expert witness for several ongoing litigation efforts involving this site.

- Task Manager for geological and hydrogeological aspects of landfill permitting and California Environmental Quality Act (CEQA) compliance for the Eagle Mountain project, a proposed 100-year-life, rail-haul landfill in central Riverside County.

- Author of groundwater monitoring section of Procedural Guidance Manual for Sanitary Landfills prepared by SCS for the California Waste Management Board.

Prior to joining SCS, Dr. Lister was District Geologist for Pennzoil Exploration and Production Company. He was in charge of petroleum exploration in eastern Texas, northern Louisiana, Arkansas, Mississippi, Alabama, Florida, and Georgia. Dr. Lister managed a drilling budget that averaged $2 million per year, and directed a staff of eight geologists. Dr. Lister has also had experience in various aspects of stratigraphy, geochemistry, structural geology, basin analysis, clastic and carbonate sedimentology, reservoir engineering, and tectonics. In addition to his work throughout California and the Gulf Coast, Dr. Lister has been involved in projects in Arizona, Utah, Nevada, Kansas, New York, South Korea, British Columbia, Bermuda, the Bahamas, and Mexico.

Publications

Clements, S., and K. H. Lister. Closure of a Site Used for Collection of Waste Pesticides and Mixing of Rodenticide Baits. West Coast Conference on Contaminated Soils and Groundwater. Abstracts. 1998.

Devinny, J. S., J. April, D. F. Buss, C. Johnson, K. Khan, K. H. Lister, J. A. Nuno, P. S. Sullivan, M. Tagoe, and D. P. Williams. The ASCE Draft Environmental Site Remediation Manual. Practice Periodical of Hazardous, Toxic, and Radioactive Waste Management. Vol. 1. 1997.

Lister, K. H. Planning Ground Water Monitoring Field Projects. Ground Water Monitoring Review, Vol. 9, No. 3. 1989.

Lister, K. H., and B. Garbaccio. A Resource for Solid Waste Disposal, S. California. Geological Society of America, Abstracts with Program, Annual Meeting. 1990. p. A376.

Lister, K. H., and T. A. Shuput. Post Closure Maintenance and Monitoring for the City of Berkeley Landfill, an Integrated Approach. Presented at Meetings of the Solid Waste Association of North America. 1992.

Lister, K. H., and A. S. Childress. Negotiating the Preliminary Endangerment Assessment Process. Fourth Annual West Coast Conference on Hydrocarbon Contaminated Soils and Ground Water Conference, Association for the Environmental Health of Soils. To Be Published in Hydrocarbon Contaminated Soils, Vol. 4. 1993.

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Lister, K. H., and B. Garbaccio. Contingency Planning for Utility Construction Through an Area Containing a Preexisting Gasoline Plume, San Diego, California. Annual West Coast Conference on Contaminated Soils and Ground Water Conference, Association for the Environmental Health of Soils. Hydrocarbon Contaminated Soils, Vol. 5. 1994.

Lister, K. H. Fast-Track Remediation for Redevelopment of a Former Integrated Steel Mill Site, Fontana, California. Remediation. Vol. 6, No. 4, p. 31.

Lister, K. H. Evaluation of Remediation Alternatives, Chapter 3 in American Society of Civil Engineers, Environmental Site Characterization and Remediation Design Guidance. ASCE Manuals and Reports on Engineering Practice, No. 99. 1999.

Lister, K. H. Evaluation of Remediation Alternatives. Presented at Convergence 2000, American Society of Civil Engineers. 2000.

Nuno, J. A., P. S. Sullivan, and K. H. Lister. Project Plan Development, Site Characterization, Risk Assessment, and Development and Evaluation of Remedial Action Alternatives, American Society of Civil Engineers/Canadian Society of Civil Engineers Environmental Engineering Conference.

Reis, R. H., K. H. Lister, and D. E. Roberson. Investigation and Remediation of the Former Expo '86. Hazardous Materials Control Research Institute. Proceedings of Research and Development Conference. 1991.

PATRICK S. SULLIVAN, R.E.A., C.P.P.

Education

B.A. - Harvard University, 1989
Biology/Ecology

Licenses and Certifications

State of California, Registered Environmental Assessor (No. 05952)
South Coast Air Quality Management District, Certified Permitting Professional (No. A-1716)
OSHA 40-Hour Health and Safety Training for Hazardous Waste Workers
Air and Waste Management Association Course on Risk Assessment and Air Dispersion Modeling; Trinity Consultants Course on Air Dispersion Modeling and General Sciences; Corporation Course on Exposure Modeling and Risk Assessment (Air, Vadose Zone, and Groundwater Modeling Using EPA Models)

Affiliations

Air and Waste Management Association (AWMA)
Water Environment Federation (WEF)
South Bay Business Environmental Coalition
Solid Waste Association of North America (SWANA)
Waste Industry Air Coalition (WIAC)
National Solid Wastes Management Association (NSWMA)
California Biomass Collaboration

Professional Experience

Mr. Sullivan has 15 years of experience in the field of environmental consulting and in the areas of human health and ecological risk assessment, chemical fate and transport modeling, and air toxics evaluation. He is currently SCS's National Partner and lead technical expert for Risk Assessment projects. Mr. Sullivan is also SCS's National Partner and lead technical expert for air quality permitting and compliance for landfills and solid waste facilities.

Mr. Sullivan is a Vice President and Project Director within SCS's California office, and is the Group Leader for the Landfill Gas/Landfill Engineering and Technical Services Group (which includes risk assessment and air quality). He is responsible for the management and oversight of the majority of the risk assessment projects conducted by the corporation. Mr. Sullivan has been the Project Manager and lead technical expert for over 25 projects relating to risk assessment, environmental modeling, and risk management for contaminated industrial properties and landfill. These projects accounted for over $1,000,000 in consulting fees associated with risk assessment work and over $5,000,000 in total fees.

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Mr. Sullivan is the Vice Chairman of the Rules and Regulations Committee for the Landfill Gas Division of SWANA and a member of the Bioreactor Committee of the Landfill Management Division of SWANA. He is one of the founding members of the WIAC and Board of Director Member for the Mother Lode Chapter of the AWMA. Mr. Sullivan is also Executive Board Member for the California Biomass Collaboration.

Selected risk assessment projects and studies Mr. Sullivan has managed or otherwise participated in include the following:

- Environmental Investigations and Risk Assessment at the Former BKK Main Street Landfill in Los Angeles County. This landfill is an old, closed site that may have received both hazardous and non-hazardous wastes. It is current occupied by two golf courses and other commercial and residential developments. Project work at this facility has included completion of soil vapor surveys, installation and monitoring of landfill gas migration probes, landfill gas sampling/analysis, oversight of soil and groundwater sampling, completion of a human health risk assessment, and negotiations with regulatory agencies. The site is currently being considered for listing on the National Priorities List (NPL) as a potential Superfund site.

- Human Health Risk Evaluation and Impact Assessment, Proposed Residential Developments, Adjacent to the Otay Landfill, Chula Vista, California. Contaminants at the site included a variety of organic and inorganic chemicals associated with a former hazardous waste and municipal solid waste landfill operations. Other activities at the site have includes evaluation of landfill gas migration, LFG design, air quality permitting, and other landfill engineering services.

- Human Health Risk Evaluation and Impact Assessment, Proposed Residential Development, Adjacent to a Landfill Site, Union City, California. Contaminants at the site included PAHs, heavy metals, and landfill gas emissions containing various organic constituents.

- Human Health Risk Evaluation and Impact Assessment, Proposed Commercial Developments, On and Adjacent to the BKK Landfill Site, West Covina, California. Contaminants at the site included a variety of organic and inorganic chemicals associated with a former hazardous waste and municipal solid waste landfill. The BKK site includes two landfills: one municipal solid waste landfill and one hazardous waste site.

- Investigation, Risk Assessment, and Remediation Kaiser Ventures Inc. Facilities, Fontana, California. For the former Kaiser Steel plant in Fontana, RI/FSs, RAPs, and Remedial Designs were prepared for three on-site operable units. Mr. Sullivan was responsible for a number of individual soil, groundwater, surface water, and waste investigations at the Kaiser site, including treatability studies, risk assessments, remedial

PATRICK S. SULLIVAN, R.E.A., C.P.P. (continued)

action plans, and hydrogeological studies, storm water pollution prevention plans, and spill prevention, control, and countermeasure (SPCC) plans. These projects included investigations of two landfill sites, with both hazardous and non-hazardous wastes, including soil, waste materials, hazardous waste, groundwater, and surface water issues.

- Human Health Risk Evaluation and Impact Assessment, Proposed Residential Development, 38th Street Burn Dump, San Diego, California. Contaminants at the site included organics, heavy metals, and other landfill-related contaminants.

- Environmental Investigations at the Ostrom Road Landfill in Wheatland, California. Project work at this site included sampling/analysis of landfill gas, assessment of landfill gas migration using soil-vapor techniques, sampling and monitoring of LFG migration probes, installation of additional migration probe for landfill gas, design and installation of a LFG collection and control system to mitigate groundwater impacts, as well as other engineering and permitting assignments.

- Ecological Risk Assessment for a Seasonal Wetland located along the San Francisco Bay in Hayward, California. The wetlands property was impacted by petroleum hydrocarbons originating from an active automobile recycling facility. The ecological risk assessment included both terrestrial and aquatic ecosystems.

- Burn Dump Investigation in San Joaquin County, California. As part of this project, Mr. Sullivan provided technical oversight for investigations of a possible burn dump site, which included soil investigations, trenching investigations to determine extent of refuse, LFG migration assessment, waste sampling/analysis, hazardous waste determination, and other project tasks. The project site was slated for residential development; therefore, all project elements we completed in consideration for this type of development.

- Human Health and Ecological Risk Assessment under ASTM's Risk-based Corrective Action (RBCA) guidance for a former diesel engine repair facility, Commerce, California. Contaminants at the site included fuel-related VOCs. The ecological risk assessment included terrestrial ecosystems.

- Human Health Risk Assessment for a proposed residential development at a former crude oil tank farm in Norwalk, California. Contaminants at the site included petroleum hydrocarbons and several heavy metals under ASTM's RCBA requirements. The assessment also included an evaluation of the potential human health impacts associated with neighboring crude oil storage facility, such as fire and explosion hazards.

- Human Health and Ecological Risk Assessment, Long Beach Naval Shipyard, Long Beach, California, which was undergoing corrective action under RCRA. Contaminants at the site included pesticides and PCBs. The ecological risk assessment included both terrestrial and aquatic ecosystems.

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- Baseline Human Health and Ecological Risk Assessment for an active chemical manufacturing facility in Santa Fe Springs, California, which is undergoing site mitigation under CERCLA. Contaminants at the site included chlorinated, aromatic, and oxygenated solvents. The ecological risk assessment included terrestrial ecosystems.

- Baseline Human Health and Ecological Risk Assessment for a former rocket manufacturing facility in Van Nuys, California, which is undergoing site mitigation under RCRA. Contaminants at the site include heavy metals, pesticides, PCBs, hydrazine, and VOCs. The ecological risk assessment included terrestrial ecosystems.

- Baseline Human Health and Ecological Risk Assessment for a former electronics manufacturing facility in Los Angeles, California. This project has also included expert testimony in support of risk assessment and other work completed on the project. Contaminants at the site included chlorinated solvents. The ecological risk assessment included terrestrial ecosystems.

- Baseline Human Health Risk Assessment for a former metals recycling facility in San Pedro, California. Contaminants at the site included heavy metals and PCBs.

- Human Health and Ecological Risk Assessment at a former pesticide manufacturing facility in Pico Rivera, California, which is undergoing site mitigation under RCRA. Contaminants at the site include heavy metals, pesticides, PCBs, and VOCs. The ecological risk assessment evaluated terrestrial ecosystems.

- Screening-level human health risk assessments for a former air strip impacted by pesticides, an electronics manufacturing facility impacted by chlorinated solvents, a storm water channel impacted by petroleum hydrocarbons and solvents, and numerous landfill sites.

- Human Health and Ecological Risk Assessment for a former chemical plant in Menlo Park, California, which is undergoing closure under RCRA. Contaminants included PCBs, dioxins/dibenzofurans, VOCs, and several heavy metals. The ecological risk assessment included aquatic and terrestrial ecosystems.

- Air toxics emissions inventory plans, reports, and risk assessments for various industrial facilities and landfills in California under AB 2588.

- Risk Management and Prevention Program (RMPP), Southern California Edison facility in Long Beach, California.

- Technical Review of Tier 1 Ecological Risk Assessment, Former Chlorate and Clor-Alkali Plants, Squamish, B.C., Canada, including review of Problem Formulation and Analysis Plans.

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Selected litigation support projects include the following:

- Litigation support and preparation of an expert report in defense of a landfill company in Pittsburgh, Pennsylvania, which was sued under the third-party provisions of the federal Clean Air Act. Project tasks including emissions estimation, regulatory applicability review, and preparation of an expert report. The case was settled in favor of our client.

- Litigation support in defense of a landfill company in Houston, Texas. Project tasks including emissions estimation, regulatory applicability review, and air quality compliance assessment.

- Litigation support and expert testimony in defense of a nuisance claim and a CERCLA cost recovery action filed against an electronic relay manufacturing facility in Los Angeles, California. Project tasks included a remedial investigation, feasibility study, remedial design, remedial action, risk assessment, and expert testimony. The first case was settled; the second case is ongoing.

- Litigation support and expert testimony as part of a toxic tort litigation filed by a plaintiff group against a large aerospace company in Burbank, California. Project tasks included emissions estimation, air dispersion modeling, air toxics risk assessment, and expert testimony before an arbitration judge. The case was settled in favor of our clients.

- Litigation support and preparation of an expert report as part of a toxic tort litigation in defense of a metal heat-treating facility in Phoenix, Arizona. Project tasks included emissions estimation, air dispersion modeling, and air toxics risk assessment. The case was settled in favor of our client.

- Litigation support as part of a CERCLA cost recovery action filed by a group of PRPs against various municipalities and public agencies, which disposed refuse at a mixed hazardous and municipal solid waste landfill in California. Project tasks included review of depositions, evaluation of industrial and hazardous waste disposed in the landfill, and development of a draft report on the contribution of the various PRPs to contamination in the landfill. Our clients were successful in the litigation.

- Litigation support as part of a nuisance lawsuit filed by the current owner of a screw manufacturing facility against the former owner in Santa Fe Springs, California. Project tasks included a site investigation, compliance audit, evaluation of on-site disposal of waste oil, and expert testimony before an arbitration judge.

- Litigation support as part of a insurance claim filed by an aerospace facility against its insurance carrier in Natick, Massachusetts. Project tasks included review of soil vapor data, vadose zone modeling, determination of the vapor-phase plume, and preparation of exhibits to be used in court. Our client was successful in the litigation.

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- Litigation support in defense of a nuisance claim and a CERCLA cost recovery action filed against a steel mill in Fontana, California. Project tasks included a remedial investigation, feasibility study, remedial design, remedial action, risk assessment, and assistance in the cross-examination of opposing experts. The case was settled in favor of our client.

- Litigation support in two lawsuits where contractors were unwittingly exposed to asbestos during building demolition after the property owners claimed that the buildings did not have asbestos-containing materials. The cases are ongoing.

Mr. Sullivan's litigation experience includes the following Proposition 65 cases in California. These cases include preparation of exposures and risk analyses and participation in settlement conferences:

- Litigation support for a defendant in a Proposition 65 lawsuit concerning exposure to methylene chloride in a silk flower cleaner.

- Litigation support for a defendant in a Proposition 65 lawsuit concerning exposure to dichlorobenzene and toluene in a bicycle tire repair kit.

- Litigation support for a defendant in a Proposition 65 lawsuit concerning exposure to lead in PVC grips and handles for various tools and equipment.

- Litigation support for a defendant in a Proposition 65 lawsuit concerning exposure to lead in cosmetics.

- Litigation support for a defendant in a Proposition 65 lawsuit concerning exposure to chromated copper arsenate in treated wood used for children's playground equipment.

- Litigation support for a defendant in a Proposition 65 lawsuit concerning the exposure to various pollutants emitted from landfills and other solid waste facilities in California.

- Risk assessment under Proposition 65 at two municipal solid waste landfills in Southern California. The chemicals of concern included various toxic organic compounds present in landfill gas.

- Risk assessment under Proposition 65 for commercial building in Los Angeles, California, with large quantities of asbestos-containing building materials.

- Risk assessment under Proposition 65 for a jewelry manufacturing facility in Los Angeles, California. Chemicals of concern included various chlorinated solvents and heavy metals.

PATRICK S. SULLIVAN, R.E.A., C.P.P. (continued)

Publications and Presentations

Sullivan, Patrick S., and Zbozinek, Jasenka V., Exposure Assessment and Toxic Distribution Modeling In Toxic Tort Litigation: Air and Soil Pathways. Seminar Proceedings, Phoenix Chapter of the State of Arizona Bar Association, One-Day Technical Meeting, November 1996.

Sullivan, Patrick S., and Lister, Kenneth H., Use of Screening Level Risk Assessment for Risk-Based Corrective Action. Conference Proceedings, Association for the Environmental Health of Soils, 7th Annual West Coast Conference on Contaminated Soil and Groundwater, Oxnard, California, February 1997.

Sullivan, Patrick S., Nuno, Julio A., and Lister, Kenneth H., The Use of Risk-Based Corrective Action in Site Mitigation Projects. Conference Proceedings, Environmental Engineering Conference, Canadian Society of Civil Engineers/American Society of Civil Engineers (CSCE/ASCE), Edmonton, Alberta, July 1997.

Albert, Lon, Kubis, Elizabeth L., and Sullivan, Patrick S., Ongoing Challenges of Emission Inventories at Municipal Solid Waste Landfills, Conference Proceedings, Emission Inventory Conference, Air and Waste Management Association (AWMA), Raleigh-Durham, North Carolina, October 1997.

Kubis, Elizabeth L., Rankin, Sue, and Sullivan, Patrick S., Strategic Planning for Landfill Gas and Air Quality Compliance at Municipal Solid Waste Landfills, Conference Proceedings, 28th Annual Solid Waste Association of North America (SWANA), Western Regional Symposium, South Lake Tahoe, Nevada, April 1999.

Pierce, Jeffrey L., and Sullivan, Patrick S., NSPS, NESHAPs, NSR, and Title V: The Impact of Federal Air Quality Regulations on Landfill Construction and Operation, Conference Proceedings, 28th Annual Solid Waste Association of North America (SWANA), Western Regional Symposium, South Lake Tahoe, Nevada, April 1999.

Sullivan, Patrick S., A Practical Approach to Clean Air Act Compliance for Landfills, Presentation at the Annual Solid Waste Association of North America (SWANA), WASTECON Conference, Reno, Nevada, October 1999.

Sullivan, Patrick S., The Use of Methane Gas from Landfills as an Alternative Fuel Source, Presentation at the U.S. Conference of Mayors/Municipal Solid Waste Management Association Fall Summit, San Jose, California, November 1999.

Sullivan, Patrick S. (lead author: Risk Assessment section), Environmental Site Characterization and Remediation Design Guidance, American Society of Civil Engineers (ASCE) Manuals and Reports on Engineering Practice No. 99, ASCE, Reston, Virginia, 1999.

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Michels, Mike, and Sullivan, Patrick S., Actual LFG Emissions Lower than EPA Estimates, Conference Proceedings, National Solid Waste Management Association (NSWMA)/ Environmental Industries Association (EIA) Waste Tech 2000 Conference, Orlando, Florida, March 2000.

Sullivan, Patrick S., and Michels, Mike, The Time Is Now for Changes to the AP-42 Section on Landfills, Conference Proceedings, 23th Annual Solid Waste Association of North America (SWANA), Landfill Gas Symposium in La Jolla, California, March 2000.

Sullivan, Patrick S., U.S. EPA's Urban Air Toxics Strategy, Conference Proceedings, Conference Proceedings, 10th Annual Technical Conference, Air and Waste Management Association (AWMA) Golden Empire Chapter, Golden West Section, Bakersfield, California, March 2000.

Mezzacappa, David, and Sullivan, Patrick S., Air Quality Pre-Construction Permits for Municipal Solid Waste Landfills, Conference Proceedings, 9th Annual Solid Waste Association of North America (SWANA), Landfill Symposium in Austin, Texas, June 2000.

Sullivan, Patrick S., Risk Characterization in Site Characterization and Remediation Design, Conference Proceedings, Convergence 2000 Environmental Engineering and Pipeline Engineering Conference, American Society of Civil Engineers (ASCE), Kansas City, Missouri, July 2000.

Nuno, Julio A., and Sullivan, Patrick S., Site Characterization, Presentation at Convergence 2000 Environmental Engineering and Pipeline Engineering Conference, American Society of Civil Engineers (ASCE), Kansas City, Missouri, July 2000.

Sullivan, Patrick S., Getting Down to Cases: Just What Is a Bioreactor Landfill, MSW Management, July/August 2000.

Sullivan, Patrick S., and Stege, G. Alexander, An Evaluation of Air and Greenhouse Gas Emissions and Methane Recovery from Bioreactor Landfills, MSW Management, September/October 2000.

Green, Roger B., Vogt, W. Gregory, and Sullivan, Patrick S., Comparison of Emissions from Bioreactor and Conventional Landfills, Conference Proceedings, Annual Solid Waste Association of North America (SWANA) WASTECON Conference in Cincinnati, Ohio, October 2000.

Vogt, W. Gregory, and Sullivan, Patrick S., Literature Review and Research Needs for Bioreactor Landfills, Conference Proceedings, National Solid Waste Management Association (NSWMA)/Environmental Industries Association (EIA) Waste Tech 2001 Conference in San Diego, California, February 2001.

PATRICK S. SULLIVAN, R.E.A., C.P.P. (continued)

Sullivan, Patrick S., and Caponi, Frank R., The Potential Impacts of the MACT Standard and Urban Air Toxics Strategy on MSW Landfills, Conference Proceedings, 24th Annual Solid Waste Association of North America (SWANA), 24th Annual Landfill Gas Symposium in Dallas, Texas, March 2001.

Sullivan, Patrick S., Bioreactor Landfill Energy Recovery, Proceedings of the U.S. EPA's and Water Environment Federation's Innovative Processes to Produce Useful Materials from Biosolids and Animal Manures--A Symposium, Chicago, Illinois, June 2001.

McCready, Ambrose A., Nordell, David, and Sullivan, Patrick S., Bioreactor Operation Feasibility Study for Fink Road Landfill, Conference Proceedings, 10th Annual Solid Waste Association of North America (SWANA), Landfill Symposium in San Diego, California, June 2001.

Sullivan, Patrick S., Landfill Gas Modeling and Emission Estimates for a Large Bioreactor Landfill in California, Presentation at the 10th Annual Solid Waste Association of North America (SWANA), Landfill Symposium in San Diego, California, June 2001.

Sullivan, Patrick S., and Green, Roger, Air Emissions, Methane Generation and Recovery, and Energy Potential for Bioreactor Landfills: Comparing the Theoretical to the Actual, Proceedings of the Annual Solid Waste Association of North America (SWANA) WASTECON Conference in Baltimore, Maryland, October 2001.

Pierce, Jeffrey L., and Sullivan, Patrick S., Economic and Financial Aspects of LFGTE Project Development in California, California Energy Commission/U.S. EPA Landfill Methane Outreach Program (LMOP), California Landfill Gas to Energy Workshop, California Landfill Gas Primer, Sacramento, California, October 2001.

Sullivan, Patrick S., Enhancing Energy Recovery from Landfills Using the Bioreactor Technology, Presentation at the 5th Annual U.S. EPA Landfill Methane Outreach Program (LMOP) Conference and Project Expo, Washington, D.C., December 2001.

Sullivan, Patrick S., and Caponi, Frank R., Air Quality Compliance for Landfill Gas to Energy Projects, Conference Proceedings, 25th Annual Solid Waste Association of North America (SWANA), 25th Annual Landfill Gas Symposium in Monterey, California, March 2002.

Sullivan, Patrick S., Huff, Raymond, and Tinker, Amy, Human Health Risk Assessment Issues for Landfills, Conference Proceedings, 25th Annual Solid Waste Association of North America (SWANA), Landfill Gas Symposium in Monterrey, California, March 2002.

Sullivan, Patrick S., Update on Air Quality Permitting and Compliance Issues for MSW Landfills, Presentation at the 31th Annual Solid Waste Association of North America (SWANA), Western Regional Symposium, South Lake Tahoe, Nevada, May 2002.

PATRICK S. SULLIVAN, R.E.A., C.P.P. (continued)

Walsh, James, and Sullivan, Patrick S., NSPS and Other Clean Air Act Issues--Recent Development and Workarounds, Proceedings of the Annual Solid Waste Association of North America (SWANA) WASTECON Conference in Long Beach, California, October 2002.

Sullivan, Patrick S., and Bins, John, Measurement of Toxic Emissions from Landfills: History and Current Developments, Conference Proceedings, Symposium on Air Quality Measurement Methods and Technology--2002, Air and Waste Management Association (AWMA), San Francisco, California, November 2002.

Sullivan, Patrick S., and Bins, John, Toxic Emissions from Landfills: History and Current Developments, Conference Proceedings, National Solid Waste Management Association (NSWMA) Waste Tech 2003 Conference in New Orleans, Louisiana, February 2003.

Morris, Jeremy, Sullivan, Patrick S., et al., Performance-Based System for Post-Closure Care at MSW Landfill--A New Approach to the Current 30-Year Time-Based System of Subtitle D, Conference Proceedings, National Solid Waste Management Association (NSWMA) Waste Tech 2003 Conference in New Orleans, Louisiana, February 2003.

Sullivan, Patrick S., et al., Landfill Gas Module, Performance-Based System for Post-Closure Care at MSW Landfill, Conference Proceedings, Conference Proceedings, 26th Annual Solid Waste Association of North America (SWANA), Landfill Gas Symposium in Tampa, Florida, March 2003.

Sullivan, Patrick S., Landfill Gas Aspects of Bioreactor Landfills, Presentation at Association of State and Territorial Solid Waste Management Officials (ASTSWMO) Annual State Solid Waste Managers' Conference, Salt Lake City, Utah, July 2003.

Huff, Raymond H., Leonard, Michelle P., and Sullivan, Patrick S., Composting Emissions Update and New Southern California Regulations, Presentation at the Annual Solid Waste Association of North America (SWANA) WASTECON Conference in St. Louis, Missouri, October 2003.

Huff, Raymond H., and Sullivan, Patrick S., Unique Landfill Gas Issues on Urban Inactive Landfills, Conference Proceedings, 27th Annual Solid Waste Association of North America (SWANA), Landfill Gas Symposium in San Antonio, Texas, March 2004 (accepted for publication).

Clarke, Steve, and Sullivan, Patrick S., Estimating the Trend in NMOC Generation and Emissions After Closure of MSW Landfills, Conference Proceedings, 27th Annual Solid Waste Association of North America (SWANA), Landfill Gas Symposium in San Antonio, Texas, March 2004 (accepted for publication).

PATRICK S. SULLIVAN, R.E.A., C.P.P. (continued)

Huff, Raymond H., and Sullivan, Patrick S., Air Quality and Odor Impacts from Landfill-Related Emissions, Conference Proceedings, Water Environment (WEF) and Air and Waste Management Association (AWMA) Odor and Air Emissions 2004, Bellevue, Washington, April 2003 (accepted for publication).

HEATHER TOMLEY

Education

B.S. - California Polytechnic State University, San Luis Obispo, 1994
Chemistry, with a minor in Psychology

M.S. - University of North Carolina, Chapel Hill, 1999
Environmental Science

Professional Experience

Ms. Tomley has a background in environmental science with emphasis in air quality, environmental health, environmental compliance, and Geographic Information Systems (GIS). Her experience with project management, environmental analysis, program development, and report writing, combined with her broad knowledge of computer technology and applications, enhances her ability to work effectively on teams or independently.

Ms. Tomley's recent project experience includes:

- Project Scientist, SCS Engineers: Ms. Tomley developed compliance reports for a metal plating facility under a Consent Agreement with DTSC; and developed New Source Performance Standards and Startup, Shutdown and Malfunction reports for landfills. She also wrote air quality and hazards sections for Initial Studies under CEQA; used GIS to distribute workload into territories to streamline staff efforts; and assisted with data analysis for environmental assessments.

- Air Quality Specialist, San Luis Obispo County Air Pollution Control District: Ms. Tomley reviewed new residential and commercial development projects under CEQA to assess and mitigate air quality impacts. She developed and managed multiple grant programs allocating over $1.2 million in funding; established a GIS program; and worked with a multiple-agency coalition to promote alternative transportation. She also assisted with the development of long-range air quality management goals and programs; assisted with development of a 5-year strategic plan to prioritize agency-wide workload on projects aimed at achieving the agency mission. She assisted with rule development and implementation, including working with a community group to develop local solutions. She also assisted with development of public outreach goals and strategies, and created public communication tools such as brochures, flyers, and websites.

- Environmental Contractor, Research Triangle Institute, Water Quality Program: Ms. Tomley reviewed Unified Watershed Assessment Reports for the EPA; indexed water bodies for U.S. states using GIS to indicate waters regulated under the Clean Water Act; and produced final maps for submittal to state and regional EPA offices.

HEATHER TOMLEY (continued)

- Environmental Researcher, University of North Carolina, Chapel Hill: Ms. Tomley developed and designed a research project to assess potential ecological risk from metals contamination at a recreational firing range; created a map of the site and contamination distribution using GPS and GIS; collected soil samples; analyzed soil chemistry and contamination (pH, CAC, TOC, total metals, SPLP); performed earthworm and lettuce seed bioassays; used the data to determine bioavailability of metals in the soil and characterized the potential ecological exposures for the area.

- Environmental Contractor, Diablo Canyon Power Plant: Ms. Tomley wrote the 1994 Toxic Emission Inventory Plan (TEIP) and corresponding report (TEIR); calculated air emissions of all toxic and criteria air pollutants released during 1993 and 1994 from the site; collected and organized Material Safety Data Sheets for all hazardous materials located on site; and developed and maintained a hazardous materials inventory database.

- Air Quality Intern, San Luis Obispo County Air Pollution Control District: Ms. Tomley was involved in research and development of air quality regulations to reduce air emissions from wood burning. She also reviewed Toxic Emission Inventory Reports for auto body shops.

- Laboratory Technician, Central Coast Analytical Services: Ms. Tomley prepared soil and water samples for metals analysis and maintained data records.

Appendix N

VSA n Associates
Résumés

VSA
n
Associates
Acoustics
Noise
Vibration
Consultants

Resume of Key Staff
Mahabir S. Atwal, Ph.D.

Education

1978	B.S. (Honors)	Physics	Leeds University
1980	M. Phil.	Physics/Acoustics	Leicester University
1982	Ph.D.	Physics/Acoustics	Leicester University
1991	M.B.A.	Business Mgmt.	Pepperdine University

General Experience

1982-83	Postdoctoral Research Associate	Purdue University
1983-84	Visiting Assistant Professor	Purdue University
1984- 92	Acoustical Consultant	Veneklasen and Associates
1992-present	Acoustical Consultant	VSA n Associates

General Noise and Vibration Control Experience

- Dr. Atwal has provided consulting on over 500 noise/vibration control projects for over 20 years. He has published over 25 technical papers on various aspects of acoustics and noise and vibration control.
- Participation in major architectural projects including apartments, airports, CEQA, condominiums, courthouses, child care centers, detention centers, environmental, gymnasiums, hospitals, industrial facilities, hotels, office buildings, laboratories, railway stations, shopping centers, university buildings. Consultation included room acoustics, sound isolation, community noise impact, impact on project of freeway or aircraft noise, and HVAC, plumbing, electrical and elevator system noise and vibration control.
- Participation in major environmental projects including noise part of environmental impact reports. Projects have included airports, residential, medical, industrial, office buildings, government facilities, transportation noise, and Participation in major construction projects including determining demolition and construction noise. Monitoring of demolition and construction noise levels and Preperation of noise part of CEQA and EIR reports.
- Freeway, aircraft, railway and industrial facility noise measurements to determine impact on existing or proposed developments. Preparation of environmental impacts reports.
- Acoustical design of large volume spaces including airports, gymnasiums, railway stations, swimming pools, malls, etc.
- Industrial noise surveys, including procedures for defining noise producing characteristics of major noise sources, establishing noise level criteria related to hearing conservation, community annoyance and speech interference, design and application of noise control.
- Community noise surveys, noise level prediction and control techniques. Noise ordinances and codes, impact studies.
- Participation in community to meetings to discuss and answer questions regarding acoustical issues and design.
- Design of noise/vibration monitoring systems to measure construction levels and sounds alarm if criteria levels are exceeded.
- Identification of noise and vibration sources/paths in existing buildings. Control of noise and vibration by means of conventional noise and vibration control elements, custom designed elements and equipment modification.

- Analysis of structural vibrations and their impact on sensitive equipment including electron and eye surgery microscopes. Assessment of structural vibrations due to steady and transient vibration inputs.
- Dynamic and static analysis of structures using finite element analysis.
- Precision calibration of acoustic transducers, measurement of the transmission loss of partitions and the absorption coefficient of acoustical materials.
- Measurement of field STC and IIC ratings.
- Speech privacy determination in open plan offices.
- Acceleration, velocity and displacement measurements.
- Sound transmission over long distances over varying terrain.
- Damping measurements. Identification of vibratory sources within an equipment and isolation and damping of the vibratory sources to reduce vibration levels and sound radiation.
- Vibration isolation of a Pulsion Laser used in refractive surgery. This type of laser has a higher degree of safety in vision correction surgery with reduced complications. The project included the identification of the signature of various components and isolation of the components from the chassis. Additional work included the design of body isolation from the exterior environment.

Research and Development

- Research in the area of light propeller driven aircraft noise reduction.
- Validation of the two-microphone sound intensity technique for source and/or noise path identification in-situ.
- The feasibility of the intensity technique to measure the transmission loss and absorption of aircraft structures.
- Development of a simple experimental/theoretical model for predicting the sound pressure level in an aircraft cabin.
- Theoretical and experimental work on sound transmission characteristics of porous materials. Development and validation of the inter-relationship between sound transmission and properties of the porous transmitting media. Properties of the porous media investigated included permeability, porosity, density, etc.

Teaching

- Teaching of senior level undergraduate course in Noise and Vibration Control and supervision of undergraduate projects in Acoustics. Purdue University.

Publications

- Atwal, M.S., David, J., Heitman, K. and Crocker, M., "Light Aircraft Sound Transmission Study," NASA CR 174540, 1983.
- Atwal, M.S. and Bernhard, R., "Prediction of Light Aircraft Interior Sound Pressure Level Using the Room Equation," NASA CR N84/10910.
- Atwal, M.S. and Crocker, M., "Noise Path Identification Using Face-to-Face and Side-by-Side Microphone Arrangements," Proceedings INTER-NOISE 1984, pp 1047-1050.
- Atwal, M.S. and Bernhard, R., "Study of Double Wall Panels for Use in Light Propeller Driven Aircraft," NASA CR 84.
- Atwal, M.S. and Bernhard, R., "Measurement of the Absorption Coefficient Using the Sound Intensity Technique," NASA CR 84.

- Atwal, M.S. and Crocker M., "The Effect on the Transmission Loss of a Double Panel of Using Helium Gas in the Gap," Proceedings NOISE-CON 85, pp 187-192.
- Atwal M.S. and Crocker, M., "Measurement of the Normal Incidence Absorption Coefficient Using the Sound Intensity Technique, Proceedings NOISE-CON 85, pp 424-428.
- Atwal, M.S., Crocker M., and Heitman, K., "Investigation of the Level Difference Between Sound Pressure and Sound Intensity in an Aircraft Cabin Under Different Fuselage Conditions," Proceedings 2nd International Congress on Acoustic Intensity, Paris, 1985.
- Atwal, M.S. and Crocker, M. "Measurement of the Absorption Coefficient of Acoustical Materials Using the Sound Intensity Method," Proceedings 2nd International Congress on Acoustic Intensity, Paris, 1985, pp 485-490.
- Atwal, M.S. and Crocker, M., "Effect on the Transmission Loss of a Double Panel of Perforating the Send Panel," Proceedings INTER-NOISE 85, Munich, pp 389-392.
- Heitman, K., Atwal, M.S. and Crocker, M., "Light Aircraft Sound Transmission Studies: The Use of the Two-Microphone Sound Intensity Technique," Noise Control Engineering J., 31, 145-153 (1988).
- Atwal, M.S., Heitman, K. and Crocker, M., "Light Aircraft Sound Transmission Studies: Noise Reduction," J. Acous. Soc. Am. 82, 1342-1348 (1978).
- Atwal, M.S., Heitman, K. and Crocker, M., "Prediction of Light Aircraft Sound Pressure Level From the Measured Sound Power Flowing into the Cabin," Proceedings INTER-NOISE 86, pp 1045-1048.
- Atwal, M.S., "Factors Affecting the Air Flow Resistance of Needle Felted Fabrics," Textile Research J. 57, 574-579 (1978).
- Atwal, M.S. and Crocker, M. "Measurement of the Absorption Coefficient of Acoustical Materials Using the Sound Intensity Method," La Revue Francaise d'Acoustique, 1987.
- Atwal, M.S., "Transmission Loss of Double Panels with Different Gases in the Gap," Presented at the 112th meeting of the Acous. Soc. Of Am., Anaheim, California, 1986.
- Atwal, M.S., "Control of Low Frequency Noise in Air Distribution Systems," Proceedings INTER-NOISE 87, Beijing, pp 111-114.
- Atwal, M.S., "Random Incidence Transmission Loss of Double Wall Panels with Different Gases in the Cavity", Proceedings INTER-NOISE 1988.
- Atwal, M.S., Ortega, J.C., and Khosrovani, H., "Community Response to Co-Generation Plant Noise", Proceedings INTER-NOISE 89.
- Atwal, M.S., "Duct Breakout Rumble problems in Air Distribution Systems", Proceedings INTER-NOISE 90.
- Atwal, M.S., "Factors Affecting the Air Resistance of Porous Fibrous Acoustical Material", Submitted to INTER-NOISE 91.
- Veneklasen, P.S. and Atwal, M.S., "The Control of Reverberation", Presented at the 125th meeting of the Acous. Soc. of Am., Ottawa, Canada.

Appendix O

Affordable Housing
Memorandum for the Record

Sapphos
Environmental
Inc
planning
resource
management
environmental
compliance

April 19, 2005
Job Number: 1416-002
Long Beach Memorial Medical Center Expansion

MEMORANDUM FOR THE RECORD

2.6 1416-002.M13

TO: City of Long Beach Redevelopment Agency/Community Development
(Ms Barbara Kaiser)

Long Beach Memorial Medical Center
(Mr. Richard DeCarlo and Ms. Susan Crockett)

FROM: Sapphos Environmental, Inc.
(Ms. Marie Campbell and Ms. Juliana R. Prosperi)

SUBJECT: Summary of the April 18, 2005, Meeting Regarding Affordable Housing Opportunities in the City of Long Beach Redevelopment Area

This Memorandum for the Record (MFR) summarizes the April 18, 2005, meeting session at the City of Long Beach for the Long Beach Memorial Medical Center Expansion (proposed project) in Long Beach, California. The meeting was held from 9:00 a.m. to 10:30 a.m. at the City of Long Beach Community Development Conference Room, 333 West Ocean Boulevard, Long Beach, California 90802. The meeting was attended by the City of Long Beach Redevelopment Agency/Community Development (Ms. Barbara Kaiser), Long Beach Memorial Medical Center (Mr. Richard DeCarlo and Ms. Susan Crockett), and Sapphos Environmental, Inc. (Ms. Juliana R. Prosperi).

The purpose of the study session was to address the need for potential affordable housing in the City of Long Beach Redevelopment Area for hospital staff, student nurses, medical staff, and hospital trainees.

• **Corporate Office:**
133 Martin Alley
Pasadena, CA 91105
Tel (626) 683-3547
Fax (626) 683-3548

• **Santa Monica Regional Office:**
1351 4th Street
Santa Monica, CA 90401
Tel (310) 260-1520
Fax (310) 260-1521

• **Billing Address:**
P.O. Box 50241
Pasadena, CA 91115

• **Email:**
sapphos@pacbell.net

This meeting was held to discuss the following five issues:

(1) Education Partnerships with California State University Long Beach (CSULB) and the Long Beach Community College (LBCC)

(2) Education and Research Locations

(3) Housing for Students

(4) Mitigation Plans for Demolished Housing

(5) The Joint Powers Authority meeting with the City of Signal Hill

LBMMC (Mr. Richard DeCarlo and Ms. Susan Crockett) opened the meeting session and introduced the five issues to be discussed. Both Mr. Richard DeCarlo and Ms. Barbara Kaiser referred to project area maps to illustrate potential parcels and buildings to use for future research locations and student housing. Ms. Barbara Kaiser will send project area maps to all meeting participants to include in the administrative record.

LBMMC currently has two partnerships with CSULB and LBCC. Student capacity has doubled in the past year and is expected to increase by approximately 150 percent in the upcoming years. Since most of the students now spend the majority of their time on the LBMMC campus and all clinical work is completed at the hospital, the need for affordable housing needs to be addressed. The LBMMC expects affordable housing that will aid both recruitment of qualified student applicants and employees and retention of current students and employees. LBMMC (Mr. Richard DeCarlo) inquired about information on housing grant opportunities, relocation assistance programs, and other means of support for housing in the City of Long Beach Redevelopment Area.

LBMMC is also seeking additional buildings to acquire for research locations in the area. Therefore, a list of available spaces will be provided, including areas near a 63-unit for senior housing located between the Vernon and Willow Avenue alleyways. Based on discussions with Ms. Barbara Kaiser, several of these small parcels could be acquired by the City of Long Beach, cleaned-up, and leased for classrooms and housing.

Mitigation plans for demolished housing were also discussed in regards to relocation procedures and assistance. Mr. Larry Triesch should be contacted at the Housing Bureau for further information on Housing Vouchers.

Based on an e-mail received from Dr. Melvin Marks, MD, on April 18, 2005, relocation fees are potentially expected to be $3,489 per household, equaling $177,939 for the proposed project, depending on how many households are determined to be low income.

The process is as follows:

1. LBMMC provides notice of demolition to households 18 months prior to demolition. Note that the tenant can waive notice, so this is subject to negotiation.

2. LBMMC provides tenant with City of Long Beach application and explanation forms.

3. LBMMC collects forms and sends to City of Long Beach Housing Services.

4. City of Long Beach evaluates whether household qualifies for relocation assistance and notifies household and LBMMC.

5. Owner deposits fees with City of Long Beach.

6. Once the tenant is verified by City of the Long Beach, the City disperses relocation assistance to the tenant.

This process is based on City of Long Beach Ordinance, Municipal Code, Chapter 21.60: "Relocation Assistance for, and Meeting Housing Needs of, Persons of Very Low and Low Income Households." This ordinance is available at: http://www.longbeach.gov/apps/cityclerk/lbmc/title-21/frame.htm

Ms. Barbara Kaiser added that a meeting with the Joint Powers Authority (JPA) will be held with the City of Signal Hill on June 30, 2005, to address housing opportunities west of Atlantic Avenue.

Should there be any questions regarding the information contained in this MFR, please contact Ms. Marie Campbell or Ms. Juliana R. Prosperi at (310) 260-1520.

SECTION 13.0
RESPONSE TO COMMENTS ON DRAFT ENVIRONMENTAL IMPACT REPORT

The Draft Environmental Impact Report (EIR) was completed and forwarded to the Governor's Office of Planning and Research (OPR) on January 25, 2005; a Notice of Completion (NOC) was posted at both OPR and the Office of Los Angeles County Clerk on the same day (January 25, 2005). A Notice of Availability (NOA) of the Draft EIR for public review was then advertised in the *Press Telegram*. The NOA was also forwarded via regular mail to 148 interested parties, including private organizations and individuals. The NOA was also mailed to federal, state, and local agencies potentially having an interest in this project. Finally, copies of the Draft EIR and NOA were mailed to 38 agency representatives. The Draft EIR was made available for public review at the City of Long Beach (City) Department of Planning and Building, the City Web site (posting delayed until January 28, 2005), and three local public libraries for a period of 45 days (January 25, 2005, to March 10, 2005).

In addition, copies of the Draft EIR were available for purchase, at reproduction cost, from the City.

The public comment period closed on March 10, 2005, at 5:00 p.m. A total of 19 letters of comment were received on the Draft EIR.

This section of the EIR contains a summary of the distribution list for the Draft EIR and a listing of the parties that provided comments during the public review period. The distribution list/respondents have been divided into the following categories: (1) Federal Agencies, (2) State Agencies, (3) Regional Agencies, (4) County Agencies, (5) Local Agencies, (6) Private Organizations, and (7) Individuals.

13.1 SUMMARY DISTRIBUTION LIST/RESPONDENTS

13.1.1 Federal Agencies

The Federal Aviation Administration received a copy of the NOA and the Draft EIR. No comment letters were received from this agency.

13.1.2 State Agencies

A total of 10 state agencies received copies of the NOA and the Draft EIR. One timely comment letter was received from the California Department of Health Services. A late letter of comment from the California Environmental Protection Agency, Department of Toxic Substances Control, and Governor's Office of Planning and Research was received following the close of the comment period.

- California Coastal Commission
- California Department of Parks and Recreation, Office of Historic Preservation
- California Department of Transportation, Division of Aeronautics
- California Department of Transportation, District 7, Office of Advance Planning
- California Environmental Protection Agency, Department of Toxic Substances Control

- California Native American Heritage Commission
- California Regional Water Quality Control Board, Region 4
- California Integrated Waste Management Board
- Office of Statewide Health Planning and Development
- OPR, State Clearinghouse

13.1.3 Regional Agencies

Two regional agencies received copies of the NOA and the Draft EIR. A late letter of comment was received from the Southern California Association of Governments following the close of the comment period.

- South Coast Air Quality Management District
- Southern California Association of Governments

13.1.4 County Agencies

Nine county agencies received copies of the NOA and the Draft EIR. One timely letter of comment was received from the County Sanitation Districts of Los Angeles County. An additional letter of comment was received from the County Sanitation Districts of Los Angeles County following the close of the comment period.

- County of Los Angeles Department of Health
- County of Los Angeles Department of Public Works, Land Development Division
- County of Los Angeles Fire Department
- County of Los Angeles Metropolitan Transportation Authority
- County Sanitation Districts of Los Angeles County
- Greater Los Angeles County Vector Control District
- Los Angeles County Consolidated Protection District
- Los Angeles County Tax Assessor
- Office of the Los Angeles County Clerk, Environmental Filings

13.1.5 Local Agencies

Nine local agencies received copies of the NOA.

- ABC Unified School District
- Compton Community College
- Compton Creek Mosquito Abatement District
- Compton Unified School District
- Environmental & Project Planning, Services Division
- Long Beach Community College District
- Long Beach Unified School District
- Paramount Unified School District
- Water Replenishment District of Southern California, Board of Directors

Copies of the Draft EIR were provided to planning commissioners and City Council members. In addition, 1 local agency and 14 City departments received copies of the NOA and the Draft EIR. A letter of comment was received from the City of Long Beach Fire Department, Fire Prevention Bureau.

- City of Long Beach Administation, Planning and Facilities Bureau
- City of Long Beach City Attorney's Office
- City of Long Beach City Manager
- City of Long Beach Department of Public Works, Traffic
- City of Long Beach Energy Department
- City of Long Beach Fire Department, Fire Prevention Bureau
- City of Long Beach Parks, Recreation, and Marine
- City of Long Beach Police Department
- City of Long Beach Redevelopment
- City of Long Beach Zoning Division
- Long Beach Water Department
- Long Beach Airport Bureau
- Long Beach Department of Health and Human Services
- Long Beach Department of Planning and Building
- Long Beach Transit

In addition, 10 nearby cities received copies of the NOA. A copy of the Draft EIR was provided to the City of Signal Hill. A letter of comment was received from the City of Signal Hill.

- City of Bellflower
- City of Carson
- City of Cerritos
- City of Compton
- City of Hawaiian Gardens
- City of Lakewood
- City of Los Alamitos
- City of Los Angeles
- City of Paramount
- City of Seal Beach

13.1.6 Private Organizations

A total of 11 private organization received copies of the NOA and the Draft EIR. Letters of comment were received from two private organizations: Californians for Justice and Environmental Defense.

- ADAMS Project Management Consulting, LLC
- Cannon Design
- Linscott, Law & Greenspan Engineers
- Long Beach Memorial Medical Center
- Moffatt & Nichol
- Miller Children's Hospital
- SCS Engineers

- Taylor
- Todd Cancer Institute
- Turner Construction Company
- VSA n Associates

Seven private organization received copies of the NOA.

- Bancap Commerical Real Estate Services
- California Earth Corporation
- El Dorado Audubon Society
- Memorial Heights
- Southern California Edison
- Sunrise Boulevard Historic District
- Wrigley Association

13.1.7 Individuals

A total of 10 letters of comment were received from individuals.

13.2 LETTERS OF COMMENT AND RESPONSES

The letters of comment received on the Draft EIR are presented in this subsection with the comments numbered and annotated in the right margin. Responses to the comments follow each comment letter. All changes and additions to the mitigation measures are made for clarification only.

13.2.1 Federal Agencies

There were no letters of comment received from federal agencies.

13.2.2 State Agencies

California Department of Health Services
Southern California Drinking Water Field Operations Branch, Los Angeles Region
Joseph E. Clisologo, PE, REA
District Engineer, Hollywood District
1449 West Temple Street, Room 202
Los Angeles, California 90028

Department of Toxic Substances Control
Southern California Cleanup Operations Branch–Cypress Office
Thomas Cota
5796 Corporate Avenue
Cypress, California 90630

State of California, Governor's Office of Planning and Research
State Clearinghouse and Planning Unit
Terry Roberts
1400 Tenth Street
P.O. Box 3044
Sacramento, California 95812

State of California—Health and Human Services Agency
Department of Health Services

California Department of Health Services
SANDRA SHEWRY
Director

ARNOLD SCHWARZENEGGER
Governor

RECEIVED
MAR 1 0 2005
Planning and Building Dept.
Community Planning

March 2, 2005

Ms. Anita Garcia
Department of Planning and Building
City of Long Beach
333 West Ocean Boulevard
Long Beach, CA 90802

Dear Ms. Garcia:

SCH# 2004081142: NOTICE OF AVAILABILITY OF THE DRAFT ENVIRONMENTAL IMPACT REPORT (EIR) FOR THE LONG BEACH MEMORIAL MEDICAL CENTER (LBMMC) EXPANSION PROJECT (PROJECT)

Thank you for the opportunity to review and comment on the subject document. The California Department of Health Services, Drinking Water Field Operations-Southern California Branch (Department) focused its review on drinking water issues and related issues. The following are the Department comments:

1. The proposed project consists of expansion/improvements at the following six distinct components: (1) Todd Cancer Institute; (2) Miller Children's Hospital (MCH) – Pediatric Inpatient Tower, Utility Trench, and Central Plant Building; (3) MCH – Pediatric Outpatient Building; (4) MCH – Link Building; (5) Roadway Realignment; and (6) Parking Program. Any expansion, construction, and developments must comply with the Department's Policy on *Criteria for the Separation of Water Mains and Non-Potable Pipelines*. The Department may provide you a copy of this Policy upon request.

2. For expansion, construction and developments in areas described in the EIR document, notifications and requests for the necessary reviews and approval should be sent to the Long Beach Water Department and the Long Beach Department of Health and Human Services' Cross-Connection/Water Program to ensure compliance with the cross-connection requirements, inspections, and the separation criteria.

Southern California Drinking Water Field Operations Branch, Los Angeles Region
1449 West Temple St., Room 202, Los Angeles, CA 90026
Telephone: (213)580-5723 Fax: (213)580-5711
Internet Address: www.dhs.ca.gov/ps/ddwem/

Ms. Anita Garcia
Page 2
March 2, 2005

3. All Potential Contaminating Activities (PCAs) that may impact domestic production well(s) within or nearby the subject area described in the EIR shall be reviewed and restricted.

4. The proposed project site is located on a closed landfill site. The EIR document states that LBMMC agreed to enter into a Voluntary Clean-UP Agreement (VCA) with the California Department of Toxic Substances Control to complete the Site Characterization Study and the Health Risk Assessment. LBMMC shall ensure that drinking water piping and related structures that will go into and through the proposed project shall not be adversely impacted by the closed landfill and other potential hazard at the project site. The Department recommends that potential problems relative to drinking water piping and related structures such as breaks and potential contamination are investigated and addressed in the Site Characterization Study and Health Risk Assessment sections of the VCA.

If you have any questions, please contact Mr. Ric M. Roda, P.E., at (213) 580-3124.

Sincerely,

Joseph E. Crisologo, P.E., R.E.A.
District Engineer
Hollywood District
Drinking Water Field Operations

cc: Mr. Scott Morgan
State Clearinghouse
P. O. Box 3044
Sacramento, CA 95812-3044

Mr. Robert C. Cheng, Ph.D., P.E.
Director of Operations
Long Beach Water Department
1800 East Wardlow Road
Long Beach, CA 90807-4994

Mr. Steven M. Nakuchi, REHS III
Long Beach Department of Health and Human Services
Cross-Connection/Water Program
2525 Grand Avenue
Long Beach, CA 90815

SDWSRF-Environmental Unit Coordinator
Drinking Water Program
Technical Program Branch
1616 Capitol Avenue, MS 7416, P.O. Box 997413
Sacramento, CA 95899-7413

California Department of Health Services
Southern California Drinking Water Field Operations Branch, Los Angeles Region
Joseph E. Clisologo, PE, REA
District Engineer, Hollywood District
1449 West Temple Street, Room 202
Los Angeles, California 90028

Response to Comment No. 1:

Thank you for the comment. The expansion, construction, and development of the Long Beach Memorial Medical Center Expansion (proposed project) at minimum shall comply with the California Department of Health Services (CDHS) Criteria for the Separation of Water Mains and Non-Potable Pipelines. The City shall send all notifications and requests for the necessary reviews and approval to the Long Beach Water Department and the Long Beach Department of Health and Human Services Cross-Connection/Water Program to ensure compliance with cross-connection requirements, inspections, and separation criteria. Therefore, the proposed project shall submit drawings and specifications to the Long Beach Water Department to ensure compliance with CDHS criteria. These measures were also incorporated into mitigation measures Hazards-14 and Hazards-15.

Response to Comment No. 2:

Thank you for the comment and opportunity to clarify this issue. As indicated in Section 3.12 of the Draft EIR, there are no production wells in the proposed project area. Groundwater in the uppermost aquifer, approximately 40 to 50 feet below ground surface, is not used as a drinking water source. Any groundwater dewatering activities necessary during site construction will be conducted under permit with the Los Angeles Regional Water Quality Control Board. However, the City of Long Beach Planning and Building Department requires the construction contractor to implement best management practices (BMP) consistent with National Pollution Discharge Elimination System (NPDES) Permit No. CAS 004003 to reduce transport of pollutants of concern from the construction site to the storm drainage and waterway system for each construction element of the proposed project. The construction contractor for each element of the proposed project is required to submit a Standard Urban Storm Water Management Plan to the City of Long Beach for review and approval at least 30 days prior to the anticipated need for a grading permit.

Response to Comment No. 3:

Thank you for the comment concerning potential impacts to relative to drinking water piping and related structures. As indicated in Section 3.5 of the Draft EIR, the proposed project site was historically used as landfill; however, drinking water supply lines will not be installed in the landfill material, as they will either be placed in clean soil at depths above the landfill material or in areas where the landfill material has been excavated for remediation and construction of the proposed buildings. The excavation will extend to approximately 25 feet below surrounding ground surface. In addition, methane control systems will be installed beneath the buildings, including trench dams and seals to prevent subsurface gases from entering any pipes or traveling along any utility trenches.

Department of Toxic Substances Control

Alan C. Lloyd, Ph.D.
Agency Secretary
Cal/EPA

5796 Corporate Avenue
Cypress, California 90630

Arnold Schwarzenegger
Governor

March 16, 2005

Ms. Anita Garcia
Project Manager
Department of Planning and Building
City of Long Beach
City Hall, 5th Floor
333 West Ocean Boulevard
Long Beach, California 90802

DRAFT ENVIRONMENTAL IMPACT REPORT (EIR) FOR THE LONG BEACH MEMORIAL MEDICAL CENTER EXPANSION PROJECT, STATE CLEARINGHOUSE NUMBER 2004081142

Dear Ms. Garcia:

The Department of Toxic Substances Control (DTSC) would like to thank you for the opportunity to comment on the draft Environmental Impact Report (EIR) for the Long Beach Memorial Medical Center (LBMMC) Expansion project (Project), dated January 25, 2005. As a Responsible Agency under the California Environmental Quality Act (CEQA), DTSC would like to ensure that the draft EIR adequately assesses the potential environmental impacts associated with any proposed remediation activities that will be undertaken at the Project site subject to the Voluntary Cleanup Agreement (VCA) between DTSC and LBMMC.

Please note the following general and specific comments that the DTSC team has issued based on a review of the draft EIR:

General Comments:

1. The approach for this Project, as we understand it, is that based on the results of the Supplemental Site Investigation that is currently underway, a Supplemental Site Characterization Report and Supplemental Human Health Risk Assessment will be submitted to DTSC for review. Given the findings of the aforementioned reports, a draft RAW will be issued to address the areas that are found to be of concern. The draft RAW will be developed in accordance with Health and Safety Code (HSC) Section 25356.1 and will include (but not be limited to):

a A description of the techniques and methods to be used in the removal action.

b. A description of the onsite contamination

c. The goals to be achieved by the removal action, any alternative removal options that were considered and rejected and the basis for that rejection; and,

d. A description of the methods that will be employed during the removal action to ensure the health and safety of the workers and the public during the removal action.

The RAW will undergo a public notice period, and if necessary, a public meeting may be held.

Our review of the draft EIR indicates that while the document addressed environmental impacts pertaining to the planned LBMMC expansion, it did not provide sufficient description of the extent and nature of contamination existing at the site, or analysis of the potential impacts associated with potential RAW activities. This is primarily due to the fact that information related to the extent and nature of the contamination is still being acquired and evaluated for the development of a draft RAW.

2. The EIR adequately addresses impacts and mitigation measures of the excavation activities related to the construction aspect of this project. However, the specific impacts and mitigation measures associated with the removal/remediation of contaminated media that may be encountered during construction have not been outlined.

3. Pertinent sections of the final EIR should be updated with the information from the most current environmental investigation, the Supplemental Site Investigation, and the updated Human Health Risk Assessment.

4. As written, please note that the draft EIR does not specifically address the clean-up activities that may need to be conducted for the site. Elements of the clean-up requiring mitigation including, but not limited to, soil excavation, onsite storage, off-site transportation, and backfill need to be adequately addressed. The actions that will be outlined in the draft RAW for the Project must be evaluated and incorporated in the final version of the EIR.

Specific Comments

1 Air Quality, Construction Impacts, Page 3.2-10: This section analyzes the potential for significant impacts to air quality that would occur from implementation of the proposed project. Under construction impacts, the removal of potentially contaminated soil in the former ravine and around the proposed project site is mentioned. Specific impacts associated with the removal of contaminated soil, and corresponding mitigation measures must be outlined in the final EIR.

2. Hazards & Hazardous Materials, Existing or Proposed Schools, Page 3.5-11: One of the recipients of the March 2, 2005 Long Beach Memorial Medical Center Supplemental Site Investigation & Cleanup Community Survey Questionnaire, responded to DTSC and identified the Oakwood Academy as being in the vicinity of LBMMC at 2951 Long Beach Boulevard. Please update the final EIR accordingly.

3 Hazards & Hazardous Materials, Measure Hazards-6, Page 3.5-15/16: As a mitigation measure, this section mentions the installation of vapor barriers and passive venting systems in the foundation of the expansion area, if determined to be required by the Health Risk Assessment. The objective of these measures would be to mitigate potential accumulation of hazardous gases inside the buildings. DTSC will evaluate all mitigation measures to assure protectiveness. The measures approved in the RAW should be incorporated into the EIR mitigation measures.

4 Hydrology and Water Quality, Groundwater, Page 3.6-6: Update the final EIR to reflect the shallow groundwater encountered in the project area during the March 2005 piezometer installation.

DTSC is working with LBMMC through the VCA process to obtain site characterization and remediation information necessary for inclusion in the final EIR, to ensure that the extent of remediation-related activities are fully disclosed and analyzed for potential impacts. We look forward to assisting the City in these efforts so that DTSC may use the certified EIR to meet its obligations under CEQA for approval of a final RAW.

If you have any questions, please contact Ms. Maryam Tasnif-Abbasi at (714) 484-5489 or me at (714) 484-5459.

Sincerely,

Thomas M. Cota, Chief
Southern California Cleanup Operations Branch – Cypress Office

cc: Ms. Nuna Tersibashian, R.E.A.
Sapphos Environmental, Inc.
133 Martin Alley
Pasadena, California 91105

Governors' Office of Planning and Research
State Clearinghouse
P.O. Box 3044
Sacramento, California 95812-3044

CEQA # 1068

Department of Toxic Substances Control
Southern California Cleanup Operations Branch–Cypress Office
Thomas Cota
5796 Corporate Avenue
Cypress, California 90630

Response to Comment No. 1:

Thank you for the comment. The City appreciates the efforts of the Department of Toxic Substances Control (DTSC) to ensure that the Draft EIR adequately assesses the potential environmental impacts associated with any proposed remediation activities that will be undertaken at the proposed project site.

Response to Comment No. 2:

The Draft EIR contains two mitigation measures, Hazards-14 and Hazards-15, that require implementation of remedial actions resulting from the Voluntary Clean-up Agreement (VCA) to be incorporated in conjunction with construction element of the proposed project. The VCA can be found in Appendix L of the EIR.

Response to Comment No. 3:

Thank you for the comment related to the extent and nature of the contamination. The Removal Action Workplan (RAW) will describe in greater detail the extent and nature of contamination existing at the site and the analysis of the potential impacts associated with remediation activities.[1] The RAW will be finalized and approved by the DTSC in May 2005. The RAW will be available for review at the City of Long Beach and at Sapphos Environmental, Inc. by appointment.

Response to Comment No. 4:

The specific impacts and mitigation measures associated with the removal and remediation of contaminated media that may be encountered during construction are specified in the EIR, including the removal of contaminated soil (as determined by the Health Risk Assessment [HRA]) within the building footprints and use of subsurface gas control systems (vapor barriers and passive venting systems) installed beneath the buildings. The RAW will provide greater details regarding the elements summarized in the DTSC letter.

Response to Comment No. 5:

The EIR will include updates to relevant sections with information gained from the Supplemental Site Investigation and HRA.

Response to Comment No. 6:

Detailed elements of the site cleanup will be described in the RAW.

---

[1] SCS Engineers. May 2005. *Removal Action Workplan*. Prepared by: SCS Engineers, 3900 Kilroy Airport Way, Suite 100, Long Beach, CA 90806. Contact: Sapphos Environmental, Inc., 133 Martin Alley, Pasadena, CA 91105.

Response to Comment No. 7:

Technical Appendix B, Air Quality, included an analysis of potential volatile organic compound (VOC) emissions during excavation of contaminated soil. This analysis will be reviewed based on the supplemental site investigation data and updated, if required. Section 3.2 of the Draft EIR will be revised to include the specific impacts associated with the removal of contaminated soil. In addition, Section ES, Executive Summary, and Section 3.2, Air Quality, of the EIR will discuss the corresponding mitigation measures that evaluate their effectiveness at decreasing VOC emissions.

At minimum, it is recommended that the following soil excavation mitigation measures be incorporated into the EIR:

- Continuous monitoring for VOCs will be employed during excavation. If preset thresholds are exceeded, mitigation measures will be implemented. These measures may consist of covering the emitting area with soil and spraying with water, foam, and surfactant (e.g., Simple Green).

- Soil stockpiles will be watered and covered with plastic sheeting, and all trucks transporting soil will be covered with tarps to control fugitive dust emissions.

Response to Comment No. 8:

Section 3.5 of the Draft EIR will be revised to identify Oakwood Academy as being in the vicinity of the proposed project site.

Response to Comment No. 9:

Section 3.5 of the Draft EIR will be revised to include the objective of mitigation measure Hazards-6 to mitigate potential accumulation of hazardous gases inside the buildings.

Response to Comment No. 10:

Section 3.6 of the Draft EIR will be revised to include the March 2005 shallow groundwater data.

Response to Comment No. 11:

The City appreciates DTSC's effort on the VCA process to ensure that the extent of remediation-related activities are fully disclosed and analyzed for potential impacts.

STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse and Planning Unit

Arnold Schwarzenegger
Governor

Sean Walsh
Director

March 15, 2005

RECEIVED
APR 04 2005
Planning and Building Dept.
Community Planning

Anita Garcia
Long Beach City
City Hall, 5th Floor
333 West Ocean Boulevard
Long Beach, CA 90802

Subject: Long Beach Memorial Medical Center Expansion
SCH#: 2004081142

Dear Anita Garcia:

The State Clearinghouse submitted the above named Draft EIR to selected state agencies for review. On the enclosed Document Details Report please note that the Clearinghouse has listed the state agencies that reviewed your document. The review period closed on March 14, 2005, and the comments from the responding agency (ies) is (are) enclosed. If this comment package is not in order, please notify the State Clearinghouse immediately. Please refer to the project's ten-digit State Clearinghouse number in future correspondence so that we may respond promptly.

Please note that Section 21104(c) of the California Public Resources Code states that:

> "A responsible or other public agency shall only make substantive comments regarding those activities involved in a project which are within an area of expertise of the agency or which are required to be carried out or approved by the agency. Those comments shall be supported by specific documentation."

These comments are forwarded for use in preparing your final environmental document. Should you need more information or clarification of the enclosed comments, we recommend that you contact the commenting agency directly.

This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act. Please contact the State Clearinghouse at (916) 445-0613 if you have any questions regarding the environmental review process.

Sincerely,

Terry Roberts

Terry Roberts
Director, State Clearinghouse

Enclosures
cc: Resources Agency

Document Details Report
State Clearinghouse Data Base

SCH# 2004081142
Project Title Long Beach Memorial Medical Center Expansion
Lead Agency Long Beach, City of

Type EIR Draft EIR

Description The proposed project includes the following six elements to be constructed within the next 5 to 10 years: (1) Todd Cancer Institute; (2) Miller Children's Hospital pediatric inpatient lower, utility trench, and central plant building; (3) Miller Children's Hospital pediatric outpatient building; (4) Miller Children's Hospital link building; (5) roadway realignment; and (6) parking program.

Lead Agency Contact

Name Anita Garcia
Agency Long Beach City
Phone (562) 570-6193 **Fax**
email
Address City Hall, 5th Floor
333 West Ocean Boulevard
City Long Beach **State** CA **Zip** 90802

Project Location

County Los Angeles
City Long Beach
Region
Cross Streets Long Beach Boulevard / North Spring Street
Parcel No. 7207-010-041
Township 4S **Range** 12W, **Section** 7 **Base**

Proximity to:

Highways I-405, I-710, SR-1
Airports Long Beach Airport
Railways Metrolink, Amirak
Waterways Los Angeles River
Schools Oakwood, Jackie Robinson
Land Use Mixed-Use District, Insititutional (I), Planning Development (PD-29), Regional Highway District (CHW), and Community Automobile-Oriented District (CCA).

Project Issues Aesthetic/Visual; Air Quality; Archaeologic-Historic; Cumulative Effects; Flood Plain/Flooding; Geologic/Seismic; Growth Inducing; Landuse; Noise; Other Issues; Public Services; Septic System; Sewer Capacity; Soil Erosion/Compaction/Grading; Solid Waste; Toxic/Hazardous; Traffic/Circulation; Water Quality; Water Supply

Reviewing Agencies Resources Agency; Regional Water Quality Control Board, Region 4; Department of Parks and Recreation; Native American Heritage Commission; Integrated Waste Management Board; Department of Health Services; Office of Emergency Services; Department of Fish and Game, Region 5; Department of Water Resources; Department of Conservation; Caltrans, District 7; Caltrans, Division of Aeronautics; Office of Historic Preservation; Air Resources Board, Transportation Projects; Department of Toxic Substances Control

Date Received 01/27/2005 **Start of Review** 01/27/2005 **End of Review** 03/14/2005

Note: Blanks in data fields result from insufficient information provided by lead agency.

State of California, Governor's Office of Planning and Research
State Clearinghouse and Planning Unit
Terry Roberts
1400 Tenth Street
P.O. Box 3044
Sacramento, California 95812

Response to Comment No. 1:

Thank you for submitting the Draft EIR to the selected state agencies for review. One timely comment letter was received from the California Department of Health Services. A late letter of comment from the California Environmental Protection Agency and the Department of Toxic Substances Control was received following the close of the comment period. Responses to all state agency comments may be found in Section 13.0 of the Final EIR.

13.2.3 Regional Agency

Southern California Association of Governments
April Grayson
Associate Regional Planner
Intergovernmental Review
818 West Seventh Street, 12th Floor
Los Angeles, California 90017-3435

SOUTHERN CALIFORNIA
ASSOCIATION of GOVERNMENTS

Main Office
818 West Seventh Street
12th Floor
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90017-3435

t (213) 236-1800
f (213) 236-1825

www.scag.ca.gov

March 10, 2004

RECEIVED
MAR 11 2005
Planning and Building Dept.
Community Planning

Ms. Anita Garcia, Department of Planning & Building
City of Long Beach
City Hall, 5th Floor
333 West Ocean Boulevard
Long Beach, CA 90802

RE: **Draft Environmental Impact Report for the Long Beach Memorial Medical Center Expansion Project - SCAG No. I 20050047 – Regional Consistency Not Determined**

Dear Ms. Garcia:

Thank you for submitting the **Draft Environmental Impact Report for the Long Beach Memorial Medical Center Expansion Project** to SCAG for review and comment. SCAG's responsibility as the region's clearinghouse per Federal Executive Order 12372 includes the implementation of CEQA §15125 [d]. This legislation requires the review of local plans, projects and programs for consistency with regional plans.

SCAG staff has evaluated the DEIR for consistency with the Regional Comprehensive Plan and Guide (RCPG) and Regional Transportation Plan (RTP). Although SCAG's September 8, 2004 comment letter on the Notice of Preparation (NOP) for this DEIR was included in Volume II, Appendices, Part A, there were only two policy reference discussions. Based on the information provided in the Draft EIR, we are unable to determine whether the Project is consistent with SCAG policies.

We expect the Final EIR to specifically cite the appropriate SCAG policies and address the manner in which the Project is consistent with applicable core policies or supportive of applicable ancillary policies. Please use our policy numbers to refer to them in your Draft EIR. Also, we would encourage you to use a side-by-side comparison of SCAG policies with a discussion of the consistency or support of the policy with the proposed Project.

The intent of this process is to provide guidance to local agencies that will contribute to the attainment of regional goals and policies. If you have any questions regarding the requirements of the regional consistency review, please contact me at (213) 236-1852. Thank you.

Sincerely,

April Grayson

APRIL GRAYSON
Associate Regional Planner
Intergovernmental Review

Southern California Association of Governments
April Grayson
Associate Regional Planner
Intergovernmental Review
818 West Seventh Street, 12th Floor
Los Angeles, California 90017-3435

Response to Comment No. 1:

The Southern California Association of Governments (SCAG) Policies 3.03 3.05, 3.09, 3.10, 3.12, 3.14, 3.18, 3.21, 3.22, and 3.23 are related to improving the standard and quality of living for the region.

The Long Beach Memorial Medical Center (LBMMC) is not expected to be growth inducing. In general, projects that induce growth include those that provide infrastructure suitable to support growth, such as the construction of additional housing. The goal of the proposed project is to meet the existing and anticipated healthcare needs of the community. The proposed project would create hundreds of jobs for Long Beach citizens and those in neighboring communities during both the design and construction phase and for many years thereafter in new support and professional staff positions.

SCAG Policy 3.27

SCAG Policy 3.27 is related to the Regional Comprehensive Plan Guide (RCPG) goals, which provide social, political, and cultural equity. The LBMMC is a nonprofit hospital committed to improving the health and well-being of individuals, families, and the community through innovation and the pursuit of excellence, making the LBMMC a preferred, operationally excellent, and fiscally sound provider of comprehensive, high-quality health services in Southern California. LBMMC has identified and prioritized 12 basic objectives that are important to achieving proposed project goals:

1. Continue the legacy of providing a high-quality environment that supports the health and well-being of patrons through the provision of a comprehensive system of programs and facilities that provide prevention, screening, diagnosis, treatment, and monitoring services to meet existing and anticipated demand in the community through the year 2020.

2. Expand and reorganize the existing approximately 1,200,000 square feet (SF) of combined inpatient, outpatient, and appurtenant facilities by approximately 500,000 SF to accommodate existing and anticipated demand through the year 2020.

3. Comply with the regulations developed by the Office of Statewide Health Planning and Development (OSHPD) as mandated by Senate Bill 1953 (Chapter 740, 1994), an amendment to and furtherance of the Alfred E. Alquist Hospital Seismic Safety Act of 1983.

4. Consolidate and relocate the diverse outpatient treatment modalities of the Todd Cancer Institute (TCI) that are currently dispersed in 24 sites located on and off the

LBMMC campus (Campus), to a single facility in proximity to the inpatient services provided at the LBMMC.

5. Provide a dedicated facility for the outpatient well care, screening, imaging, diagnosis, treatment, and monitoring of cancer and noncancer patients to accommodate the anticipated need for 375 patients to be served per day by the year 2007, and to accommodate approximately 500 patients per day to meet anticipated needs through the year 2020.

6. In the immediate proximity of the Miller Children's Hospital (MCH), provide a pediatric inpatient tower that would increase capacity for pediatric surgical cases that would satisfy a mandate from the CDHS to provide seven operating rooms by January 2008. An additional three operating rooms would need to be provided between years 2008 and 2015 to meet anticipated demand through the year 2020.

7. In the immediate proximity of the MCH, provide a pediatric inpatient tower that would increase capacity for newborn intensive care services and general pediatric patients. The new pediatric inpatient tower will be sized to accommodate the 10-percent increase in the need for pediatric inpatient treatment of children under the age of 15 between years 2000 and 2003, and the projected additional increase of 1 percent per year through the year 2020. The increase in capacity would require 72 additional beds by the year 2008 and another 92 additional beds between years 2008 and 2015 to meet anticipated demand through the year 2020.

8. Consolidate and relocate the diverse pediatric outpatient services, well care, screening, diagnosis, treatment, and monitoring into a single, dedicated building in close proximity to the MCH.

9. Within the Campus, provide a building designated for mixed uses to accommodate retail uses, such as a gift shop, florist, and food and beverage service, to serve MCH employees, patients, and visitors.

10. Provide adequate access and egress to the Campus from Long Beach Boulevard and Atlantic Avenue.

11. Provide adequate infrastructure to support circulation within the Campus.

12. Provide sufficient parking capacity to comply with the City of Long Beach parking ordinance.

SCAG Polices 5.07 and 5.11

SCAG Policies 5.07 and 5.11 are related to air quality core actions. The proposed project is expected to result in significant temporary impacts to air quality during the construction phases, which exceed the South Coast Air Quality Management District (SCAQMD) thresholds. Construction-related activities such as grading, hauling soil, and worker commute trips are the primary sources of the impacts. Operational impacts to air quality would be anticipated to have significant impacts due to mobile sources and stationary sources such as natural gas landscaping and consumer products. Mitigation measures to reduce these impacts include: moistening exposed soil to reduce fugitive dust, applying water or chemical stabilizers on grading areas to reduce fugitive dust emissions, turning off construction equipment and trucks when not in use, and encouraging the use of carpooling and public transportation to reduce vehicular emissions.

SCAG Policy 11.07

SCAG Policy 11.07 is related to water quality recommendations and policy options. Although the proposed project would result in an approximately 50-percent increase in wastewater generation, according to the Regional Water Quality Control Board (RWQCB), it would not result in the expansion of wastewater treatment facilities. In addition, the proposed project would not result in the need to construct new or expand existing storm drainage systems. The Long Beach Water Department has indicated that the water from entitlements and resources is sufficient to serve to the proposed project.

Response to Comment No. 2:

Thank you for the support of the proposed project. The City of Long Beach Planning Commission will take the comments and concerns into consideration during the decision-making process.

13.2.4 County Agency

County Sanitation Districts of Los Angeles County
Ruth I. Frazen
Engineering Technician, Planning & Property Management Section
1955 Workman Mill Road
Whittier, California 90601-1400

1416-002

WATER RECLAMATION

SOLID WASTE MANAGEMENT

COUNTY SANITATION DISTRICTS
OF LOS ANGELES COUNTY

1955 Workman Mill Road, Whittier, CA 90601-1400
Mailing Address: P.O. Box 4998, Whittier, CA 90607-4998
Telephone: (562) 699-7411, FAX: (562) 699-5422
www.lacsd.org

JAMES F. STAHL
Chief Engineer and General Manager

August 26, 2004

File No: 03-00.04-00

RECEIVED
SEP 09 2004
Planning and Building Dept.
Community Planning

Ms. Anita Garcia, Project Manager
Department of Planning and Building
City of Long Beach
333 West Ocean Boulevard, 5th Floor
Long Beach, CA 90802

Dear Ms. Garcia:

Long Beach Memorial Medical Center Expansion Project

The County Sanitation Districts of Los Angeles County (Districts) received a Notice of Preparation of a Draft Environmental Impact Report and an Initial Study for the subject project on August 23, 2004. The proposed development is located within the jurisdictional boundaries of District No. 3. We offer the following comments regarding sewerage service:

1. The wastewater flow originating from the proposed project will discharge to local sewer lines, which are not maintained by the Districts, for conveyance to the Districts' Joint Outfall "C" Unit 3F Trunk Sewer, located in 27th Street, Patterson Street, and in a right of way between these two streets east of Long Beach Boulevard. This 18-inch diameter trunk sewer has a design capacity of 2.3 million gallons per day (mgd) and conveyed a peak flow of 0.7 mgd at the points of connection when last measured in 2001. Although capacity exists for the proposed project at the local connection points, downstream of these points the Districts' Joint Outfall "C" Unit 1 is at capacity. Relief of this section of trunk sewer is currently in design, however, until the design and subsequent construction of the trunk line are complete, new or increased discharges are allowed only during off-peak hours. Relief sewer construction is anticipated to be completed in 2006, however, design and/or construction issues could cause delays. Completion of the Todd Cancer Institute, Phase I is anticipated to be September 2006. Trunk sewer facilities may not be available at that time to accept unrestricted discharges from the Todd Cancer Institute, Phase I.

2. Discharges from acute care and skilled nursing care hospitals are considered industrial discharges. Therefore, the proposed project will require amendments to the current Districts' permit for Industrial Wastewater Discharge. Project developers should contact the Districts' Industrial Waste Section at extension 2900, and will be required to forward copies of final plans and supporting information for the proposed project to the Districts for review and approval before beginning project construction.

3. Section 3.17(e) states that "use of the County's capacity by the proposed project is subject to approval by the City of Long Beach," while in fact, use of the Districts' sewers must be approved by the Districts.

4. The wastewater generated by the proposed project will be treated at the Joint Water Pollution Control Plant located in the City of Carson, which has a design capacity of 385 mgd and currently processes an average flow of 321.6 mgd.

5. The expected increase in average wastewater flow from the project site at build-out is approximately 150,000 gallons per day.

6. The Districts maintain sewerage facilities within the project area that may be affected by the proposed project. Approval to construct improvements within a Districts' sewer easement and/or over or near a Districts' sewer is required before construction may begin. A copy of the Districts' buildover procedures and requirements is enclosed for your information. For additional information regarding the buildover procedure, please contact Mr. Darrell Hatch at extension 2766.

7. The Districts are empowered by the California Health and Safety Code to charge a fee for the privilege of connecting (directly or indirectly) to the Districts' Sewerage System or increasing the existing strength and/or quantity of wastewater attributable to a particular parcel or operation already connected. This connection fee is required to construct an incremental expansion of the Sewerage System to accommodate the proposed project, which will mitigate the impact of this project on the present Sewerage System. Payment of a connection fee will be required before a permit to connect to the sewer is issued. A copy of the Connection Fee Information Sheet is enclosed for your convenience. For more specific information regarding the connection fee application procedure and fees, please contact the Connection Fee Counter at extension 2727.

8. In order for the Districts to conform to the requirements of the Federal Clean Air Act (CAA), the design capacities of the Districts' wastewater treatment facilities are based on the regional growth forecast adopted by the Southern California Association of Governments (SCAG). Specific policies included in the development of the SCAG regional growth forecast are incorporated into the Air Quality Management Plan, which is prepared by the South Coast Air Quality Management District in order to improve air quality in the South Coast Air Basin as mandated by the CAA. All expansions of Districts' facilities must be sized and service phased in a manner that will be consistent with the SCAG regional growth forecast for the counties of Los Angeles, Orange, San Bernardino, Riverside, Ventura, and Imperial. The available capacity of the Districts' treatment facilities will, therefore, be limited to levels associated with the approved growth identified by SCAG. As such, this letter does not constitute a guarantee of wastewater service, but is to advise you that the Districts intend to provide this service up to the levels that are legally permitted and to inform you of the currently existing capacity and any proposed expansion of the Districts' facilities.

If you have any questions, please contact the undersigned at (562) 699-7411, extension 2717.

Very truly yours,

James F. Stahl

Ruth I. Frazen

Ruth I. Frazen
Engineering Technician
Planning & Property Management Section

RIF:rf
Enclosures
c: D. Hatch
S. Wienke
394173.1

COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY
1955 Workman Mill Road / P.O. Box 4998 / Whittier, California 90607-4998 / (562) 699-7411

BUILDOVER PROCEDURES AND REQUIREMENTS

The Districts do not encourage the building of improvements over sewer easements as such encroachments may esult in limited access or damage to the underlying sewers. The Districts consider "buildover" proposals on a case-by-ase basis. The following explains the Districts' procedure for processing buildover requests.

A developer or property owner (applicant) desiring to construct an improvement over a Districts' sewer easement required to obtain a "Buildover Agreement" (BOA) from the Districts. Four (4) sets of the following information are equired from the developer or property owner in order for Districts' staff to evaluate the proposal:

1. A vicinity map showing the general location of the proposed improvements in relation to the surrounding streets;
2. A grading plan* and site plan showing the location of the sewer easement, sewer line, and manholes in relation to the proposed improvement. Include information regarding the removal and replacement of unsuitable soil along with cut/fill depths;
3. The calculated footing** and/or traffic loadings resulting from the project, project-related activity, and post-construction activity. A list of construction equipment to be used at the site and a soils report for the project are also required; and
4. A foundation plan and a footing detail,** showing the elevations* and locations of the footings for the improvement(s). Also include profile and/or cross section drawings showing the proposed improvement(s) in relation to the sewer line.

NOTE: Your request will not be processed unless the above-specified information is provided.***

This information is simultaneously forwarded to various departments within the Districts for review. Their omments serve as the basis by which the Districts' acceptability of a proposed buildover case is determined.

Subsequent to the Districts' review of the proposed buildover request, the applicant will be advised in writing of e Districts' decision. The applicant is then required to submit six (6) sets of plans that incorporate corrections, as pplicable. The submitted plans must include the following note:

No grading, soil removal, soil fill, or construction activity shall be performed within the Districts' easement without on-site approval of the proposed activity by a Districts' inspector. Contractor shall contact Mr. Phil Friess, Sewerage System Manager, at (310) 638-1161, a minimum of two weeks prior to the start of construction to make the necessary arrangements.

Upon receipt of the final plans, the Districts will mail a BOA detailing the conditions under which the proposed nprovement is acceptable to the Districts. It shall be the responsibility of the fee owner of the property to sign the BOA he signature must be notarized) and return it to the Districts. The BOA is subsequently executed by the Districts' Chief Engineer (or designee) and is submitted to the Los Angeles County Recorder's Office for recordation. After the recorded OA is received from the Recorder's Office, a copy of the document along with one set of final plans is returned to the pplicant.

Under normal conditions, approximately six to eight weeks are required for Districts' staff to properly evaluate a ildover proposal. It is recommended that the Districts be contacted as early as possible during planning of the project. you have any further questions regarding Buildover Procedures and Requirements, please contact Mr. Darrell Hatch at 562) 699-7411, extension 2766, or by e-mail at dhatch@lacsd.org.

ll elevations must be based on U.S.G.S. datum.
All plans must be prepared by a registered Civil/Structural Engineer in the State of California.
**For proposed minor surface improvements, contact the Districts prior to submittal. Some of the information requirements may be waived.

**INFORMATION SHEET FOR APPLICANTS
PROPOSING TO CONNECT OR INCREASE THEIR DISCHARGE TO
THE COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY SEWERAGE SYSTEM**

THE PROGRAM

The County Sanitation Districts of Los Angeles County are empowered by the California Health and Safety Code to charge a fee for the privilege of connecting to a Sanitation District's sewerage system. Your connection to a City or County sewer constitutes a connection to a Sanitation District's sewerage system as these sewers flow into a Sanitation District's system. The County Sanitation Districts of Los Angeles County provide for the conveyance, treatment, and disposal of your wastewater. **PAYMENT OF A CONNECTION FEE TO THE COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY WILL BE REQUIRED BEFORE A CITY OR THE COUNTY WILL ISSUE YOU A PERMIT TO CONNECT TO THE SEWER.**

I. WHO IS REQUIRED TO PAY A CONNECTION FEE?

1. Anyone connecting to the sewerage system for the first time for any structure located on a parcel(s) of land within a County Sanitation District of Los Angeles County.
2. Anyone increasing the quantity of wastewater discharged due to the construction of additional dwelling units on or a change in land usage of a parcel already connected to the sewerage system.
3. Anyone increasing the improvement square footage of a commercial or institutional parcel by more than 25 percent.
4. Anyone increasing the quantity and/or strength of wastewater from an industrial parcel.
5. If you qualify for an Ad Valorem Tax or Demolition Credit, connection fee will be adjusted accordingly.

II. HOW ARE THE CONNECTION FEES USED?

The connection fees are used to provide additional conveyance, treatment, and disposal facilities (capital facilities) which are made necessary by new users connecting to a Sanitation District's sewerage system or by existing users who significantly increase the quantity or strength of their wastewater discharge. The Connection Fee Program insures that all users pay their fair share for any necessary expansion of the system.

III. HOW MUCH IS MY CONNECTION FEE?

Your connection fee can be determined from the Connection Fee Schedule specific to the Sanitation District in which your parcel(s) to be connected is located. A Sanitation District boundary map is attached to each corresponding Sanitation District Connection Fee Schedule. Your City or County sewer permitting office has copies of the Connection Fee Schedule(s) and Sanitation District boundary map(s) for your parcel(s). If you require verification of the Sanitation District in which your parcel is located, please call the Sanitation Districts' information number listed under Item IX below.

IV. WHAT FORMS ARE REQUIRED*?

The Connection Fee application package consists of the following:

1. Information Sheet for Applicants (this form)
2. Application for Sewer Connection

County Sanitation Districts of Los Angeles County
Ruth I. Frazen
Engineering Technician, Planning & Property Management Section
1955 Workman Mill Road
Whittier, California 90601-1400
(August 26, 2004, Letter)

Section 3.12.2 and Section 3.12.4 of the Draft EIR have been revised to incorporate comments from the August 26, 2004, letter.

Response to Comment No. 1:

The proposed project is located within the jurisdictional boundaries of the County Sanitation Districts of Los Angeles County, District 3. The wastewater flow from the proposed project will discharge to local sewer lines maintained by the Long Beach Water Department. The discharge will be conveyed to the County Sanitation Districts Joint Outfall "C," Unit 3F, Trunk Sewer, located in Patterson Street east of Long Beach Boulevard. This 18-inch-diameter trunk sewer has a design capacity of 2.3 million gallons per day (MGD). This trunk sewer conveyed a peak flow of 0.7 MGD at the points of connection when last measured in 2001.

Although capacity exists for the proposed project at the local connection points, the County Sanitation Districts Joint Outfall "C," Unit 1, downstream from the local connection points, is at capacity. Relief of this section of trunk sewer is currently in design; however, until the design and subsequent construction of the trunk line are complete, new or increased discharges are allowed only during off-peak hours. Relief sewer construction of the Joint Outfall "C," Unit 1, is anticipated to be completed by late 2006 or early 2007; however, design and construction issues could cause delays. The MCH is anticipated to be completed by January 2008. The TCI Phase I is anticipated to be completed by September 2006. Therefore, the proposed project is expected to utilize alternative local connection routes, where necessary, or the trunk line sewer only during off-peak hours.

Response to Comment No. 2:

Wastewater discharges from acute care and skilled nursing care hospitals are considered industrial discharges. Therefore, the proposed project will require amendments to the current County Sanitation Districts permit for industrial wastewater discharge.

Response to Comment No. 3:

Project developers will be required to forward copies of final plans and supporting information for the proposed project to the County Sanitation Districts for review and approval before beginning construction.

Response to Comment No. 4:

The wastewater generated by the proposed project will be treated at the County Sanitation Districts Joint Water Pollution Control Plant located in the City of Carson. This plant has a design capacity of 385 MGD and currently processes an average flow of 321.6 MGD.

Response to Comment No. 5:

The expected increase in average wastewater flow from the proposed project site at build-out is approximately 150,000 gallons per day.

Response to Comment No. 6:

The County Sanitation Districts will maintain sewer facilities within the proposed project area that may be affected by the proposed project. Approval to construct improvements within a County Sanitation Districts sewer easement and/or over or near a sewer is required before construction may begin. A copy of the County Sanitation Districts' build-over procedures and requirements was reviewed.

Response to Comment No. 7:

Thank you for the comment and copies of the enclosed materials regarding connection fee payments and information sheets. It is understood that the County Sanitation Districts are empowered by the California Health and Safety Code to charge a fee for the privilege of connecting (directly or indirectly) to the County Sanitation Districts Sewerage System, or increasing the existing strength and quantity of wastewater attributable to a particular parcel or operation already connected. The connection fee is required for the incremental expansion of the sewer system to accommodate the proposed project. The proposed project will mitigate for impacts to the present sewer system. The project proponent understands that a payment of a connection fee will be required before a permit to connect to the sewer is issued.

Response to Comment No. 8:

The input regarding the federal Clean Air Act (CAA) and the County Sanitation Districts' wastewater treatment facilities is appreciated. In order for the County Sanitation Districts to conform to the requirements of the CAA, the design capacities of the County Sanitation Districts wastewater treatment facilities are based on the regional growth forecast adopted by SCAG. Specific policies included in the development of the SCAG regional growth forecast are incorporated into the Air Quality Management Plan, which is prepared by SCAQMD in order to improve air quality in the South Coast Air Basin, as mandated by the CAA. All expansions of County Sanitation Districts facilities must be sized and service-phased in a manner that will be consistent with the SCAG regional growth forecast for the Los Angeles, Orange, San Bernardino, Riverside, Ventura, and Imperial Counties. The available capacity of the County Sanitation Districts treatment facilities will, therefore, be limited to levels associated with the approved growth identified by SCAG. The project proponent understands the County Sanitation Districts need to advise on the wastewater treatment service facility levels legally permitted and the current capacity of the wastewater treatment facilities.

WATER RECLAMATION
SOLID WASTE MANAGEMENT

COUNTY SANITATION DISTRICTS
OF LOS ANGELES COUNTY

1955 Workman Mill Road, Whittier, CA 90601-1400
Mailing Address: P.O. Box 4998, Whittier, CA 90607-4998
Telephone: (562) 699-7411, FAX: (562) 699-5422
www.lacsd.org

JAMES F. STAHL
Chief Engineer and General Manager

February 23, 2005

File No: 03-00.04-00

RECEIVED
FEB 28 2005
Planning and Building Dept.
Community Planning

Ms. Anita Garcia, Project Manager
Department of Planning and Building
City of Long Beach
333 West Ocean Boulevard, 5th Floor
Long Beach, CA 90802

Dear Ms. Garcia:

Long Beach Memorial Medical Center Expansion Project

The County Sanitation Districts of Los Angeles County (Districts) received a Draft Environmental Impact Report (DEIR) for the subject project on January 25, 2005. The proposed development is located within the jurisdictional boundaries of District No. 3. We offer the following comments:

1. Comments in the Districts' August 26, 2004 letter (copy included in the DEIR) were not discussed in or incorporated into the DEIR or Moffatt & Nicol's Utility Study.

2. Previous comments still apply to the subject project with the exception of the following updated information. Relief sewer construction of the Joint Outfall "C" Unit 1 is now anticipated to be completed in late 2006 or early 2007.

3. The Districts' trunk sewers are not shown in Figure 3.12.2-1. Please contact the Districts' public counter at (562) 699-7411, extension 1205, to request sewer drawings for trunk sewers within the project area. Copies of Districts' trunk sewer drawings are also available by facsimile request sent to (562) 699-5422.

4. The Joint Water Pollution Control Plant provides full secondary treatment to all wastewater received.

If you have any questions, please contact the undersigned at (562) 699-7411, extension 2717.

Very truly yours,

James F. Stahl

Ruth I. Frazen

Ruth I. Frazen
Engineering Technician
Planning & Property Management Section

RIF:rf
c: D. Hatch
S. Wienke
461838.1

County Sanitation Districts of Los Angeles County
Ruth I. Frazen
Engineering Technician, Planning & Property Management Section
1955 Workman Mill Road
Whittier, California 90601-1400
(February 23, 2005, Letter)

Response to Comment No. 1:

The comments from the County Sanitation Districts of Los Angeles County August 26, 2004, letter were not incorporated into Section 3.12, Utilities and Service Systems, of the EIR or the Mofatt and Nichol Utility Study. However, comments from the original August 26, 2004, letter and the February 23, 2005, letter have been reviewed and responded to separately in the Final EIR, Section 12.0, Clarifications and Revisions, and Section 13.0, Response to Comments, beginning on page 13-6).

Response to Comment No. 2:

Thank you for the comment regarding relief sewer construction of the County Sanitation Districts Joint Outfall "C," Unit 1, anticipated to be completed by late 2006 or early 2007. All previous comments will continue to apply to the rest of the proposed project.

Response to Comment No. 3:

Thank you for the information regarding the missing trunk sewers not shown in Figure 3.12.2-1, *Existing Sanitary Sewer, Storm Drain, and Water Lines in the Proposed Project Vicinity,* of the Draft EIR. As requested, the sewer drawings will be provided by the County Sanitation Districts and incorporated into the EIR.

Response to Comment No. 4:

It is understood that the County Sanitation Districts Joint Water Pollution Control Plant will provide full secondary treatment to all wastewater received.

13.2.5 Local Agencies

City of Long Beach Fire Prevention Bureau
Hank Teran
Deputy Fire Marshal
333 West Ocean Boulevard
Long Beach, California 90802

City of Signal Hill
Gary Jones
Director of Community Development
2175 Cherry Avenue
Signal Hill, California 90755

City of Long Beach
Working Together to Serve

Memorandum

RECEIVED
MAR 02 2005
Planning and Building Dept.
Community Planning

Date: March 2, 2005

To: Anita Garcia, Advanced Planning

From: Hank Teran, Deputy Fire Marshal, Fire Prevention Bureau

Subject: **Draft EIR Review- Memorial Hospital Expansion**

At your request Fire Prevention conducted a review of the above document. The draft document was found to be satisfactory in reference to fire prevention code issues.

However, it is highly recommended that a full time fire inspector be provided in order to afford expedited field inspections and the coordination of construction issues during the building phase of this project.

If you have any questions, please contact me at extension 82584.

cc: Scott Giles, Deputy Chief, Fire Marshal
Alan Patalano, Deputy Chief, Operations

City of Long Beach Fire Prevention Bureau
Hank Teran
Deputy Fire Marshal
333 West Ocean Boulevard
Long Beach, California 90802

Response to Comment No. 1:

Thank you for the recent letter concerning the Draft EIR for the proposed project. The recommendation that a full-time fire inspector be provided during field inspections and the construction phase for the proposed project is duly noted by LBMMC.

City of Signal Hill

2175 Cherry Avenue • Signal Hill, CA 90755

RECEIVED
MAR 1 0 2005
Planning and Building Dept.
Community Planning

March 8, 2005

Anita Garcia
Department of Planning and Building
City of Long Beach
City Hall, 5th Floor
333 West Ocean Blvd.
Long Beach, CA 90802

Dear Ms. Garcia:

Subject: Long Beach Memorial Medical Center Expansion DEIR

The City of Signal Hill has completed review of the Long Beach Memorial Medical Center Expansion DEIR. The report may satisfy the minimum requirements of CEQA, but avoids by omission, discussion of existing conditions and facilities located nearby in the City of Signal Hill that may negatively affect future occupants of the proposed hospital building expansion. For example, Enviroserve Inc., a large hazardous waste management facility (transfer facility/ station), is located less than 400 feet east of the proposed hospital expansion site (Attachments). Implementation of the proposed project may expose hospital expansion occupants to odors and health risks.

Figure 2.6-1 should be revised as follows:

- 36 (A&A Ready Mix) and 38 (Gundry Estates) symbols on the map are transposed
- 37 ("Sixth Building Industrial") should read Six Industrial Buildings. The site symbol should be relocated to the west side of Temple Avenue in the City of Signal Hill
- 39 (Las Brisas Apartments) the symbol should be relocated on the west side of California Avenue.
- 23 (Java Lanes Residential) should be relocated on the south side of Pacific Coast Highway in the City of Long Beach.

The traffic impact analysis should address the following issues:

1. The project will affect Willow and Atlantic, but because of right-of-way constraints, no mitigation is recommended. This project will create a LOS of E for future and background traffic and project. It will cause an impact at the intersection of 0.029 for 2008 and 0.040 for 2014, which is greater than the City's threshold of 0.020.

2. Further analysis of the existing counts for the Willow and Atlantic intersection show a maximum of 166 right turn movements for westbound PM Peak traffic, but the adjusted PM peak is 116. The difference is significant. It reduces the overall project impacts on Willow to be insignificant.

3. The trip distribution does not adequately address Willow Street as a bypass for the 405 Freeway. Willow Street is used by the hospital bound traffic and was recommended by hospital staff as an alternate route to the 405 Freeway and Pacific Coast Highway.

4. Based upon these comments, AM and PM Peak Periods should be reevaluated for the level of intersection impact significance.

Should you have questions regarding these comments please contact Gary Jones, Director of Community Development at (562) 989-7345, Charlie Honeycutt, Director of Public Works at (562) 989-7356 or Bill Zimmerman, City Consulting Traffic Engineer at (562) 594-8589 x 11 or www.wgze.com .

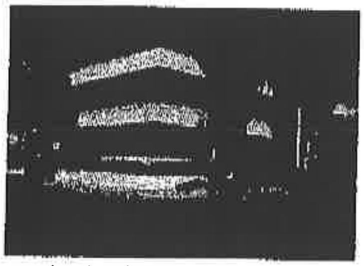
Regards,

Gary Jones, Director of Community Development

CC: City Manager
Director of Public Works
City Consulting Traffic Engineer

Attachments

A Brief Introduction



The founders of Enviroserv originally specialized in the chemical industry, providing a variety of products and services. Their customers needed an outlet for the hazardous waste generated in their production process. Environmental Recovery Services, Inc. d.b.a. (Enviroserv) grew out of that need for reliable and responsible hazardous waste management. Now entering our thirteenth year in the industry, we have become the preeminent provider of hazardous waste and industrial services in the United States. In this short period of time we have grown to service nearly 3,500 clients throughout North America.

Enviroserv is a full service Industrial Environmental Management Company. We specialize in alternative disposal technologies, waste minimization & consolidation and engineering services. In providing our clients with such options, they realize an immediate savings in both packaging and disposal costs, as well as reduced liabilities from upgraded disposal dispositions. Today our newest division is Environmental Engineering Services, where we offer our clients the same approach to medium and large-scale projects as our hazardous waste management.

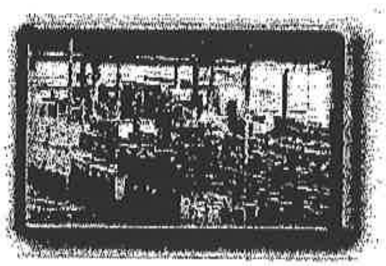
Mission Statement

- To provide our clients with unparalleled service in the management of their hazardous waste, while maintaining our commitment to the community and the environment.
- To reduce waste through minimization and consolidation programs and ensure that every opportunity is taken to make use of recycling.
- To afford our clients with the most innovative and environmentally sound solutions to match their business needs.

Company Information

Our headquarters and facility is located at 2650 Lime Avenue in Signal Hill, California. By telephone toll-free from within California: (800) 368-4778, otherwise (562) 427-7277 and FAX (562) 490-7272. A live operator will answer your calls 24 hours a day, seven days a week, in case assistance is needed after normal working hours.

Please see our WebPages on the Internet at Enviroserv.net; also we can be emailed at jscott@enviroserv.net.



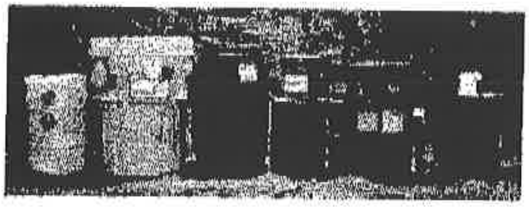
Today, Enviroserv is a dynamic, fast growing corporation with offices and facilities in Signal Hill, California and in the Bay Area in northern California as well. Our 80 plus employees move as many as 10,000 drums a month through our facility in Signal Hill, and in total we handle well over a hundred million pounds of non-hazardous, and state & federal hazardous waste each year.

Enviroserv is truly committed to providing unparalleled service while maintaining a commitment to the environmental impact on the community. You can rest assured that your company's concern for the integrity employed and the use of environmentally safe disposal methods is paramount for Enviroserv as well.

ENVIRONMENTAL RECOVERY SERVICES, INC.

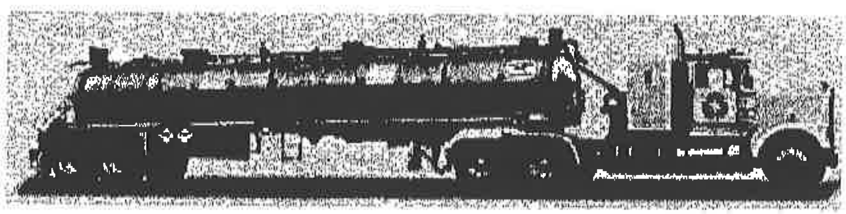
Our goal at Enviroserv is to achieve the highest level of productivity and efficiency possible, while meeting or exceeding your expectations. We hope you will come to enjoy these benefits as well.

Client Services



Waste Minimization: The goal of Enviroserv is to improve the overall efficiency of your waste management. We seek to minimize and consolidate waste streams whenever possible. With simple modifications to a generation process and or packaging configurations, we can substantially reduce present waste management costs.

Drums can be bulked into intermediate packaging such as: cubic yard super-sacks, boxes or totes. Existing cubic yard containers can usually bulk into roll-off bins, end-dumps or vacuum tankers. In some cases a waste can be re-used, becoming a commodity that instead of a waste material. Therefore, disposal cost can actually be transformed into a profit and liability is virtually eliminated.



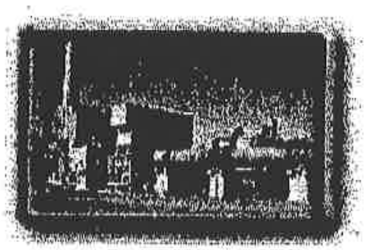
Dramatic cost savings can be achieved when a model waste management program is undertaken to minimize, consolidate and repackage waste streams. Enviroserv maintains strategic alliances with TSD facilities that afford handling of your industrial and hazardous waste management needs anywhere in North America. Enviroserv's network of Transfer, Storage and Disposal Facilities, along with multiple fleets of service vehicles will efficiently address your every need.

Disposal Alternatives: Enviroserv constantly searches for new technologies and applications for the disposition of our client's waste. In many cases we have been able to move a waste stream from a landfill application, to that of recycling, for the same cost. This enables the generator to realize the benefits of greatly reduced liability.

Treatment Options

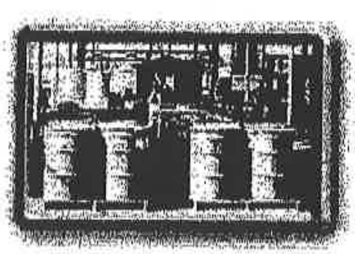
Co-Generation: Co-Generation is often referred to as "Waste to Energy Technology." Non-Hazardous wastes, and / or Non-RCRA wastes (California), including: pharmaceutical products, oil absorbed material, plastic film, debris, manufacturing trimmings, empty containers, consumer packaged goods, and a variety of other non-hazardous wastes can be recycled using Co-Generation Technology. The waste is processed thoroughly to complete combustion providing energy for municipal utilities.

Fuels Blending: Waste streams that have a minimum BTU value of 5,000 are prime candidates for supplemental fuels. Hazardous waste is recycled by blending liquid and even solid wastes into a supplemental fuel, for energy recovery in industrial furnaces or cement kilns. This is the preferred method of disposition for any waste streams falling within fuel blenders parameters. Fuels Blending is cheaper by far than incineration, and liability is virtually eliminated.



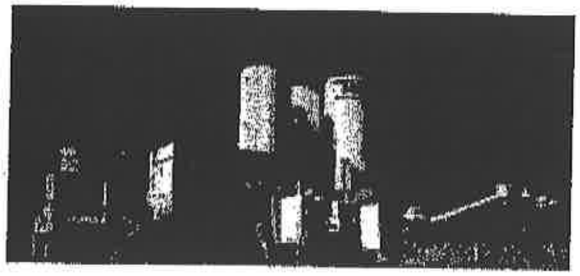
Incineration: Waste that is contaminated with RCRA levels of certain contaminants may not be applicable for any treatment standard other than incineration. This would of course include land-banned contaminants. The contaminated wastes are incinerated to complete destruction, though a hazardous ash remains which is stabilized and land filled. This is by far the most expensive form of waste remediation.

Land Disposal: Non-Hazardous, California-Hazardous and even some RCRA-Hazardous soils can be land applied when allowed by the EPA's universal treatment standards. This application is not always the least expensive option. However, there remains the liability of burying your contaminated waste.



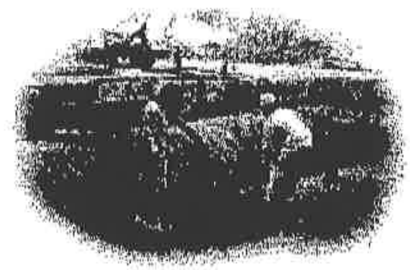
Recycling: Many waste streams, such as oils, oily water, solvents, etc., are sent to recycling facilities to be processed or reclaimed into a reusable product. Supplemental fuels are another example of wastes that are reused for other purposes, thus also achieving recycling status. We strive to recycle all of our clients' wastes when possible.

Engineering Services



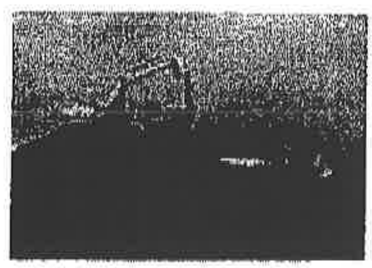
Soil Remediation: Most regulatory agencies have strict clean-up levels that require remediation or removal of contaminated soils. Contamination may be as simple as petroleum hydrocarbons, or as complex as volatiles and heavy metals. Enviroserv offers several solutions as outlined in the Soil Remediation Technologies section.

UST Compliance: Today everyone is aware of the complex regulations surrounding underground storage tanks. We specialize in the compliance, removal and installation of USTs in California. Enviroserv offers a turnkey approach to your UST challenge and can even contract for the ground-up phase of your construction.

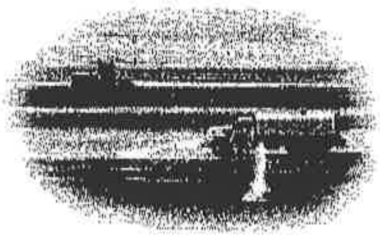


Demolition: Enviroserv has a growing expertise in the field of dismantling and demolishing facilities and sites contaminated with hazardous materials. Some examples are; Asbestos impacted buildings, Plating shops, and chemical companies. Special care is required during all phases of this type of work for the identification, handling, transportation and disposal of contaminated debris.

Construction: State and federal regulations require minimum standards for secondary containment of hazardous waste and for the hazardous waste storage area itself. Enviroserv offers turnkey service in the upgrade and/or construction of both of these required areas. Often all that is necessary in a hazardous waste storage area is the addition of berms or recoating of the containment area itself.

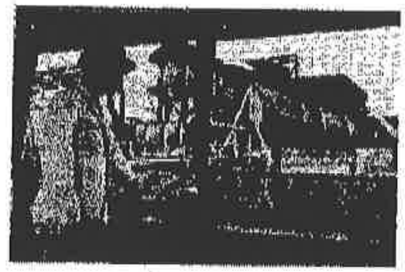


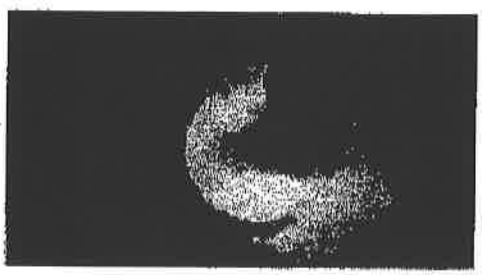
Soil Remediation Technologies



Bio-Remediation: This technology is typically applied on-site for low levels of petroleum hydrocarbon contamination, though off-site Bio-Remediation is available as well. The soil is excavated and a biological agent is added and mixed with the contaminated soil. This alone can dramatically lower the levels of hydrocarbons present, often to below clean-up standards.

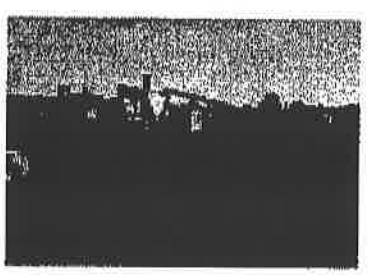
Thermal Desorption: Perhaps the most preferred method of treating petroleum impacted soils is thermal desorption. In this application, soil is excavated, removed from the site, and taken to a treatment facility. Here the soil is heated in a rotary kiln to approximately 1,500 degrees. The hydrocarbons are flashed off, rendering the soil clean, whereby it is reused, typically as fill or base for other construction projects. On extremely large scale projects, insitu thermal desorption units are available. Today some F-coded RCRA soils cans be thermally desorbed instead of the more costly incineration.





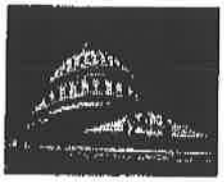
Incineration: Soil that is contaminated with RCRA levels of certain contaminants may not be applicable for any other treatment standard than incineration. This would of course include land-banned contaminants. The contaminated soil is incinerated through to complete destruction, though a hazardous ash remains which is stabilized and land filled. This is by far the most expensive form of soil remediation.

Land Disposal: Non-Hazardous, Non-RCRA and even some RCRA soils can be land applied when allowed by the EPA's universal treatment standards. This application is not always the least expensive option, and there remains the liability of burying your contaminated waste, which may come back to haunt.



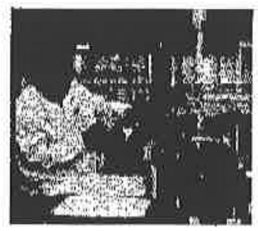
On-Site Fixation/Stabilization: RCRA and Non-RCRA Soils contaminated with heavy metals can be stabilized on-site. Ionic and covalent bonding is used to bind the metals in a silicate or similar sequestering matrix and limit the leaching characteristics of said metals to below applicable state or federal threshold limits. Processed soil is then transported off-site as Non-Hazardous.

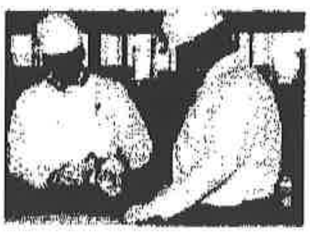
More Client Services



CFR and Title 22 dictates that waste must be characterized prior to transport and acceptance into a facility for disposal. By law, the generator is responsible for determining the characterization of their waste, either by generator's knowledge, Material Safety Data Sheets (MSDS) or with the use of laboratory analytical. Enviroserv will assist in this process by providing analytical services, either in the field as needed or in the laboratory. Strict governmental compliance with all local, state and federal laws and regulations will always be adhered to.

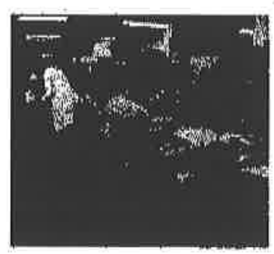
Laboratory Services: Enviroserv retains the services of California state certified laboratories only. Theses labs are capable of the following required analytics: Atomic Absorption (AA), AA – flame, AA Spectroscopy – graphite furnace, Fluorescence, Gas Chromatography (GC), and GC-Mass Spectrometry for all regulated organics, X-ray Fluorescence, Organic Vapor analyzer and Inductively Coupled Plasma/Atomic emission spectroscopy, pH, and flash-point test. TSDFs also have in-house labs per permit requirements.





Profiling Services: Additionally, Enviroserv will prepare all necessary profiles for every facility used your company at no charge. Completed profiles will be presented to the appropriate personnel for review and signature. There is never a profiling fee, however, charges may be applicable for required analytical, or field services.

Manifesting Services: Upon profile approval by the TSDF, proper manifests and labels are computer generated by Enviroserv with the correct DOT and EPA classifications. Manifests are available for review prior to shipment upon request. Our compliance staff is always on hand to research unusual waste streams that crop up occasionally.



City of Signal Hill
Gary Jones
Director of Community Development
2175 Cherry Avenue
Signal Hill, California 90755

Response to Comment No. 1:

Thank you for the comment regarding the discussion in the Draft EIR of existing conditions and facilities located near the City of Signal Hill. The area surrounding the Campus was examined to determine if there are any projects currently in progress or proposed for the future that could potentially impact the proposed project, creating a cumulative significant impact. Related projects that are anticipated within the next year that lie within an approximate 1-mile radius of the proposed project site include those shown in Table 2.6-1, *List of Related Projects,* and Figure 2.6-1, *Location of Related Projects*, of the Draft EIR. The HRA prepared by SCS Engineers did not specifically evaluate impacts to hospital patients from off-site sources. However, these impacts are expected to be negligible due to rapid wind dispersion and dilution.

Response to Comment No. 2:

Thank you for the review of Figure 2.6-1 of the Draft EIR. The figure has been revised based on the comments.

Response to Comment No. 3:

Thank you for the comment regarding impacts to Atlantic Avenue at Willow Street. As indicated in Section 8.0 of Appendix J, *Traffic Analysis,* of the Draft EIR, the proposed project will significantly impact Atlantic Avenue at Willow Street in years 2008 and 2014. However, due to physical and right-of-way restrictions that prohibit any widening at this intersection, capacity-enhancing improvements are not feasible, thus resulting in a significant unavoidable traffic impact. Appendix J and Section 3.11, Traffic and Transportation, of the Draft EIR address this issue.

Response to Comment No. 4:

Thank you for the comment regarding the Atlantic Avenue and Willow Street intersection. Consistent with City criteria and typical traffic impact analysis methodology, the Draft EIR traffic analysis utilized the traffic volumes associated with the peak hour of the entire intersection. For the intersection of Atlantic Avenue and Willow Street, the p.m. peak hour for the entire intersection occurred between 4:45 p.m. and 5:45 p.m. During this period, the westbound right-turn p.m. peak-hour traffic volume totaled 118 vehicles. Thus, the use of this value is correct and justified. The 166 westbound right-turn p.m. peak-hour vehicles referenced in the comment correspond to the peak hour of the westbound right-turn only, not the entire intersection.

Response to Comment No. 5:

The project trip distribution patterns for the proposed project were developed based on several factors, including (1) the site's proximity to major traffic carriers (i.e., Long Beach Boulevard, Atlantic Avenue, Wardlow Road, Willow Street, etc.); (2) expected localized traffic flow patterns based on adjacent street channelization and presence of traffic signals; (3) existing intersection traffic volumes; (4) ingress and egress availability at the proposed project site and the location of existing and proposed parking areas; and (5) input from City staff. Figures 5-1 and 5-2 of Appendix J of the Draft EIR illustrate the traffic distribution patterns for the proposed project. Please note that the City has reviewed and approved the proposed traffic distribution patterns for the proposed project. Review of these figures indicates that approximately 5 percent of project-related traffic is expected to utilize Willow Street and Spring Street as access roadways to the proposed project site to and from the east (potentially as bypass routes to the San Diego Freeway [I-405]).

Nonetheless, to address the City of Signal Hill's concerns, a supplemental traffic sensitivity analysis was undertaken and is contained under 3.11.5, Cumulative Impacts, of Section 12, Clarifications and Revisions.

As a result of the analysis, the intersection of Atlantic Avenue and Willow Street is forecast to operate at unacceptable level of service (LOS) F during the p.m. peak hour for year 2014 traffic conditions. Consistent with the findings of the Draft EIR traffic analysis, the proposed project significantly impacts this location. Based on the results of this sensitivity analysis, the proposed project does not impact the intersections of California Avenue at Willow Street and Orange Avenue at Willow Street.

Response to Comment No. 6

Thank you for the comment regarding a.m. and p.m. peak-hour period impacts on the three key intersections. Comment Nos. 3, 4, and 5 do not change the findings and conclusions contained in the Draft EIR. The findings of the Draft EIR traffic analysis are accurate and valid.

Response to Comment No. 7:

Thank you for providing the Enviroserv Company information. The City requires that all hazardous materials be assessed through waste minimization. Please see Section 3.12, Utilities and Service Systems, and mitigation measures Utility-1 through Utility-4. It is expected that all waste entering the Enviroserv Company facility would be packaged properly, that the facility is operated in accordance with state and federal hazardous waste regulations, and that the facility is in full compliance with its operating permits and procedures. This would virtually eliminate community exposure to hazardous waste emissions.

13.2.6 Private Organizations

Californians for Justice
Solomon Rivera
Executive Director
755 Pine Avenue
Long Beach, California 90813

Environmental Defense
Jerilyn López Mendoza
Attorney/Policy Director, Environmental Justice Project Office
One Park Plaza
3250 Wilshire Boulevard, Suite 1400
Los Angeles, California 90010

If they take Xs in the Morning
That will be Going for US that night

Californians for Justice

Education Fund

www.caljustice.org

1611 Telegraph Ave., #317 Oakland, CA 94612 (510) 452-2728 Fax (510) 452-3552 | 1971 Las Plumas San Jose, CA 95133 (408) 272-0236 Fax (408) 272-0315 | 755 Pine Avenue Long Beach, CA 90813 (562) 951-1015 Fax (562) 951-9444 | 4265 Fairmount Dr., # 200 San Diego, CA 92105 (619) 641-7750 Fax (619) 516-1734 | 2014 Tulare Ave., #716 Fresno, CA 93721 (559) 443-1394 Fax (559) 443-1343

Ms. Anita Garcia, Project Manager
City of Long Beach
Department of Planning and Building
City Hall, Fifth Floor
Long Beach, CA 90802

RECEIVED
MAR 1 0 2005
Planning and Building Dept.
Community Planning

Dear Ms. Garcia,

I am writing on behalf of Californians for Justice (CFJ), to raise concerns over health impacts related to the Long Beach Memorial Hospital Expansion. Californians for Justice is a statewide, grassroots organization with offices in five cities, including Long Beach. CFJ brings together people of color, young people, and poor people together by leading community education efforts and mobilizing public support for major policy change in California.

We understand that the area that would be impacted is overwhelmingly African American. While air quality is an issue that affects the health of all community members, African Americans have a significantly higher rate of asthma or asthma-related problems. Additionally, the extra traffic and air pollution resulting from construction will disproportionately impact the health of African Americans.

Because our ability to learn is tied to our health, we want to make sure that we are addressing the opportunities community members have in a fair playing field when it comes to education. Our organization would like to request that the final EIR address the air quality concerns that impact the health of our community, and that the city seriously take into account input from local community members. You should consider our organization as a "community of interest", and notify us of public hearings, mailing and other efforts to inform and engage the community on this important development project. Long Beach needs more quality health care, but we cannot allow poor, minority resident to suffer in the process.

Sincerely,

Solomon Rivera
Executive Director
Californians for Justice

Californians for Justice
Solomon Rivera
Executive Director
755 Pine Avenue
Long Beach, California 90813

Response to Comment No. 1:

Thank you for the comment. In response to the concern over the health impact related to the proposed project, Section 3.2, Air Quality, of the Draft EIR was evaluated in accordance with the methodologies and information provided by Appendix G of the State of California Environmental Quality Act (CEQA) Guidelines, SCAQMD,[2] and the Air Quality Technical Report prepared by SCS Engineers (Appendix C, Air Quality Technical Report, of the Draft EIR).

Response to Comment No. 2:

Please refer to Section 12, Clarifications and Revisions, of Volume III of the EIR, which demonstrates that the area is predominately White, Asian, and Hispanic. Surrounding adjacent communities are predominately Hispanic or White and Hispanic, and the African American population ranges from 8 to 21 percent.

SCS Engineers based their analysis on the ambient air standards recommended by SCAQMD in its 1993 CEQA Air Quality Handbook. The SCAQMD's emission thresholds apply to all federally regulated air pollutants except lead, which is not exceeded in the Los Angeles Basin. The ambient air standards regulated by the SCAQMD are established for the protection of sensitive receptors, which are facilities or structures that house or contain populations that are more susceptible to being adversely impacted due to compromised immune systems. This population includes the elderly, children, and persons with respiratory illnesses (including asthma or asthma-related problems) or impaired lung function.

Section 3.2, Air Quality, of the Draft EIR identified nearby long-term health care facilities, rehabilitation centers, and convalescent centers to be sensitive receptors. The analysis revealed that the greatest potential for exposure of sensitive receptors to air contaminants would occur during the temporary construction phase, when potentially contaminated soil would be uncovered and equipment would be used for site grading, materials delivery, and building construction. The closest proposed project element would be the construction of the MCH pediatric inpatient tower, which is estimated to be approximately 413 feet from the center of the main LBMMC building. The analysis concluded that the potential exposures for both inpatients and outpatients would be acute because the duration of stay is much less than would be expected for a long-term care facility. The impacts to off-site resident receptors, estimated at 5,500 feet from the MCH pediatric inpatient tower, are expected to be greatly dispersed because of the distance. Overall, all potential risk levels for sensitive receptors, which consists of the population in and adjacent to the proposed project site, were determined to be less than significant.

[2] South Coast Air Quality Management District. 1993. *CEQA Air Quality Handbook.* Contact: 21865 Copley Drive, Diamond Bar, CA 91765.

Response to Comment No. 3:

As stated in the statement of objectives for the proposed project, one of the goals is to improve the health and well-being of the community. It is the intent of the EIR to identify and focus on the significant environmental effects of all phases of the proposed project. The preparation of the Draft EIR extensively analyzed air quality issues, which included the potential health effects on the community. Development of the proposed project, however, will result in significant emissions of carbon monoxide, nitrogen oxides and reactive organic gases. Section 3.2, Air Quality, analyzed the impacts to air quality from construction and operation of the proposed project and concluded that there were no significant anticipated impacts from the operation of the proposed project. The 13 mitigation measures specified in Section 3.2, Air Quality, are capable of reducing the potential air quality impacts. The mitigation measures included methods to reduce fugitive dust emissions and reduce idling emissions from construction equipment. In addition, the Draft EIR recommended implementing construction management techniques to limit the amount of construction equipment operating simultaneously at the site. Nitrogen oxide emissions during the short-term construction phase will remain significant. However, the emissions are expected to cease upon completion of construction.

The Final EIR intends to revise and refine the environmental analysis and mitigation measures contained in the Draft EIR by incorporating the comments and recommendations received during the 45-day public review period. Each comment received is thoroughly reviewed and comprehensively evaluated. The City of Long Beach Planning Commission will take all comments and concerns into consideration during the decision-making process. Californians for Justice will be added to the distribution list. Any future notifications and mailings pertaining to the proposed project will be transmitted to Californians for Justice.

ENVIRONMENTAL DEFENSE

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MAR 10 2005

Planning and Building Dept.
Community Planning

March 10, 2005

City of Long Beach
Attn: Ms. Anita Garcia
Project Manager
Department of Planning and Building
City Hall, 5th Floor
333 West Ocean Boulevard
Long Beach, CA 90802
VIA FACSIMILE: 562-570-6610

Re: Long Beach Memorial Medical Center Expansion Project
January 25, 2005 Draft Environmental Impact Report

Dear Ms. Garcia:

The following are comments on the January 25, 2005 Draft Environmental Impact Report ("DEIR") prepared by Sapphos Environmental, Inc. for the Long Beach Memorial Medical Center Expansion Project ("Project"). These comments are submitted by Environmental Defense, a non-profit, non-governmental and non-partisan environmental organization with more than 400,000 members nationwide. Since 1967, our organization has linked science, economics, and law in tackling environmental problems. We are a leading national organization dedicated to protecting the environmental rights of all people, including future generations, and our members live and work in the communities that will be affected by the proposed Long Beach Medical Center expansion.

An EIR "must include detail sufficient to enable those who did not participate in its preparation to understand and to consider meaningfully the issues raised by the proposed project." (*Laurel Heights Improvement Association v. Regents of Univ. of Cal. ("Laurel Heights I")* (1988) 47 Cal.3d 376, 405.) These comments are made pursuant to 14 Cal. Code Regs § 15204 on grounds that (1) the Project Description is inadequate; (2) the DEIR does not adequately analyze the impacts the Project will have on traffic, air quality, noise, and health risks; and (3) the DEIR fails to identify or analyze alternatives and mitigation measures that would avoid and/or mitigate the project's significant effects.

Los Angeles Environmental Justice Project Office · One Park Plaza · 3250 Wilshire Boulevard, Suite 1400 · Los Angeles, CA 90010
Tel 213 386 5501 · Fax 213 386 5577 · www.environmentaldefense.org
New York, NY · Washington, DC · Oakland, CA · Boulder, CO · Raleigh, NC · Austin, TX · Boston, MA

In preparing these comments we consulted with two scientific experts on the environmental impacts of the Project. Copies of their specialized reports are referred to in these comments and attached hereto along with copies of their resumes. Pursuant to 14 Cal. Code Reg § 150204(d), the County may contact our office if further consultation is necessary.

Project Proposal

The Project application proposes to expand its current 1,214,000 square feet medical facility by approximately 425,000 square feet over the next ten years. The facility is located on 54 acres in central Long Beach. (DEIR, p. ES-1)

The Project would consist of six distinct components: (1) Todd Cancer Institute; (2) Miller Children's Hospital – Pediatric Inpatient Tower, Utility Trench, and Central Plant Building; (3) Miller Children's Hospital – Pediatric Outpatient Building; (4) Miller Children's Hospital – Link Building; (5) Roadway Realignment; and (6) Parking Program. (DEIR, p. ES-1)

LEGAL ANALYSIS

A. THE PROJECT DESCRIPTION IS INADEQUATE.

The DEIR fails to provide an adequate project description and contains a large number of errors and internal inconsistencies. The limited available information indicates that the Project would have significant impacts on air quality and consumptive water use that have not been discussed, evaluated, or mitigated in the record due to a flawed project description.

An accurate and complete Project description is the heart of an EIR and is necessary for an intelligent evaluation of the potential environmental impacts of a project. As explained in the discussion following Section 15124 of the CEQA Guidelines,[1] the EIR must describe the proposed project "in a way that will be meaningful to the public, to the other reviewing agencies, and to the decision-makers." "An accurate, stable and finite project description is the *sine-qua non* of an informative and legally sufficient EIR." (*County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185. In contrast, "[a] curtailed, enigmatic or unstable project description draws a red herring across the path of public input." *Id.*, at 197–98.

Here, both our experts, Mr. Brohard and Mr. Williams, identified that the Project description is incomplete and inaccurate, contains a large number of internal inconsistencies, and presents a moving target.

---

[1] California Code of Regulations, Title 14, Secs. 15000 et seq. ("CEQA Guidelines").

B. THE DEIR DOES NOT ADEQUATELY ANALYZE THE ENVIRONMENTAL IMPACTS OF THE PROJECT.

The identification of a project's significant environmental impacts is one of the primary purposes of an EIR and is necessary to provide government agencies and the public with detailed information about the effects a project likely will have on the environment prior to project approval. (Pub. Resources Code, §§ 21002, 21002.1(a); see also *Laurel Heights I, supra*, 47 Cal.3d at 392.)

An EIR's conclusion that impacts are not significant must be supported by rigorous analysis and concrete substantial evidence before the determination that project impacts are insignificant is upheld, especially where the impacts in question are clearly not minor or trivial. *(Kings County v. Farm Bureau v. City of Hanford,* (1990) 221 Cal.App.3d 692) Additionally, CEQA requires that the EIR "identify facts and analysis supporting [its] conclusion." (Guidelines, § 15130(a)(2).)

Our experts concluded that the entire traffic analysis is incorrect and the evidence in the record shows that the Project may have far more significant adverse environmental impacts in both traffic and air quality than are analyzed in the DEIR.

1. Proposed Project's Traffic Impacts Will Have A Significant Effect On The Environment.

Our office retained Tom Brohard, from Tom Brohard and Associates, as a traffic consultant to evaluate this Project. Mr. Brohard's review of the DEIR disclosed numerous errors and outstanding transportation, traffic and parking issues associated with the proposed expansion project that have not been properly or adequately addressed. For example, Mr. Brohard found significant errors regarding trip generation, the foundation of not only the traffic impact analysis but also various other sections of the Draft EIR involving noise and air quality. Because of the inaccuracies in the Draft EIR and the Traffic Impact Study ("TIS"), Mr. Brohard opines that the entire traffic analysis is incorrect and the evidence in the record shows that the Project may have far more significant adverse environmental impacts in both traffic and air quality than are analyzed in the DEIR. See Letter from Tom Brohard to Anita Garcia, dated March 9, 2005 ("Brohard Report").

Mr. Brohard recommends that the following concerns from his traffic analysis, which are briefly summarized herein, be carefully studied and addressed in a Recirculated Draft EIR:

(a) Trips associated with several project components have been incorrectly forecasted

Trips associated with several project components have been incorrectly forecasted in the Draft Traffic Impact Analysis and carried forward throughout various sections of the Draft EIR. The significant underestimation of project trips leads to additional significant project traffic impacts at other locations that have not been disclosed or mitigated.

By using faulty methodology, the Draft EIR has grossly understated the number of daily and peak hour trips. Mr. Brohard concluded that Phase I of the Miller Children's Hospital will generate 2,620 daily, 205 AM, and 230 PM trips; not 850 daily, 81 AM, and 94 PM trips shown in Table 3.11.4-2 of the DEIR. (Brohard, p. 6) Phase II of the Project will generate 1,745 daily, 135 AM, and 155 PM trips; not 1,087 daily, 104 AM, and 119 PM trips shown in Table 3.11.4-2 of the DEIR. (Brohard, p. 6) The DEIR's calculation of trips for the proposed expansion of Long Beach Memorial Medical Center is understated by 33 percent for daily traffic, by 30 percent for AM peak hour traffic, and by 26 percent for PM peak hour traffic.

Draft EIR does not include the proposed 20,000 square foot link building at Miller Children's Hospital or any of the daily or peak hour trips associated with this project component. (Brohard, p. 6) Brohard predicts that the facility will generate 720 daily trips, 50 AM peak hour trips, and 75 PM peak hour trips. None of these trips have been analyzed in the DEIR.

There are also significant differences between the forecasts of transit trips presented in the Draft EIR and those contained in the Draft Traffic Impact Analysis, with those in the Traffic Impact Analysis being more than four times (430 percent) higher than those presented in the Draft EIR. (Brohard, p. 7)

(b) <u>Project impacts on transit services have not been properly evaluated or mitigated.</u>

Without identifying or quantifying the utilization or the transit capacity, Mr. Brohard concluded that it is not possible to conclude that the public transit system will not be significantly impacted by this project (Brohard, p. 8)

(c) <u>Significant project traffic impacts at critical intersections have been identified and subsequently dismissed without proper evaluation of suitable mitigation measures.</u>

Significant project traffic impacts in Year 2008 have been identified at eleven intersections in Table 3.11.5-2 on Page 3.11-25 of the Draft EIR. Mr. Brohard found that only ten of these intersections are listed in the section involving mitigation measures. (Brohard, p. 8). The DEIR concluded that the impacts to five of ten intersections would not be mitigated to below the level of significance for the year 2014 planning horizon." (Brohard, p. 8-9) The mitigation measures for three significantly impacted intersections are dismissed by stating, "No physical mitigation measure is feasible."

Mr. Brohard listed several ways in which the intersections could feasibly be mitigated. (Brohard, p. 9) This DEIR fails to analyze any of them.

(d) <u>The parking analysis fails to consider the fragmented parking supply as well as limitations on the use of specific parking areas.</u>

The DEIR incorrectly identifies the parking requirements of the City of Long Beach as the existing parking demand. An occupancy study of actual parking conditions at Long Beach Memorial Medical Center must be made in order to accurately forecast the parking requirements for the expanded facility. (Brohard, p. 10)

(e) <u>There are several inconsistencies between the project description of component sizes and schedules compared to those used in the analysis of parking during various phases of construction.</u>

Mr. Brohard found several inconsistencies between the project description and the component sizes and their schedules that were used to estimate parking needs during construction. (Brohard, p. 11) Sites L and M accounting for 534 parking spaces during construction activities will be leased from other property owners. A more realistic schedule must be developed for these two parking lots. The DEIR assumes 121 parking spaces can be provided on this site, but the truth is that it will add no more parking since parking is already being practiced at this location. (Brohard, p. 11)

These increases in traffic without adequate mitigation also contradict the City General Plan regarding traffic. (Williams Report, p. 10, described below)

2. Proposed Project's Air Quality Impacts Will Have A Significant Effect On The Environment.

The underestimation in the traffic analysis also carries through other sections of the Draft EIR, resulting in additional significant project impacts in the areas of air quality.

For example, as stated above, Mr. Brohard's traffic analysis showed that the DEIR's calculation of trips for the proposed Project is understated by 33 percent for daily traffic, by 30 percent for AM peak hour traffic, and by 26 percent for PM peak hour traffic. This increased trip calculation must be analyzed for potential impacts on air quality.

The DEIR traffic analysis does not include the proposed 20,000 square foot link building at Miller Children's Hospital or any of the daily or peak hour trips associated with this project component. (Brohard, p. 6) Brohard predicts that the facility will generate 720 daily trips, 50 AM peak hour trips, and 75 PM peak hour trips. None of these trips have been analyzed in the DEIR, including the air quality impact analysis.

Mr. Williams also concludes that the underestimated traffic impacts will cause a "cascading impact" on air emissions. (See, Report of John Williams, p. 6) Mr. Williams points out that the DEIR did not model the potential for localized increases in air pollutants, or "hot spots," at and near the eleven impacted intersections. The potential for dangerous air emissions is high, yet the DEIR did not analyze hot spot areas.

The DEIR also does not consider the air impacts on sensitive receptors, such as the hospital itself, from the operations increases in air pollutants from ongoing construction. (Williams, p. 7) Nor does the DEIR analyze the elevated levels of diesel emissions from the daily operation of heavy diesel-powered equipment and haul trucks used in the construction of the hospital expansion. (Williams, p. 9) This increase in air pollutants contradicts the City's General Plan regarding air pollutants. (Williams, p. 10)

The air quality section of the DEIR evaluated potential impacts associated with the proposed project and determined that the Project will have a potentially significant unavoidable impact on air quality. However the DEIR fails to adequately analyze mitigation measures, even though the noise level is of great concern to neighbors of the Project and mitigation measures are available. The DEIR should be recirculated to discuss mitigation measures based on the DEIR's current analysis and the increase in traffic as stated in Mr. Brohard's calculations.

3. Proposed Project's Noise Impacts Will Have A Significant Effect On The Environment.

The underestimation in the traffic analysis will also result in additional significant project impacts in the areas of air quality. The DEIR fails take this into account or to mention any mitigation whatsoever, even though the noise level is of great concern to neighbors of the Project and mitigation measures are available. The DEIR should be recirculated to discuss mitigation measures.

4. Proposed Project Will Have A Significant Impact On Health Risk Of The Community And Patients.

Although completely unaddressed in the DEIR, the City's record shows that the Project site for this hospital is heavily contaminated, endangering the hospital's thousands of patients and the surrounding community. The DEIR failed to fully analyze and disclose all information on the likely impacts of constructing and operating hospital expansion at the contaminated location. (Williams, p. 2)

Mr. William's analysis shows that he expansion site is riddled with an unknown number of old oil wells, an abandoned "ravine" landfill, and an oil field waste disposal site. The site is tainted with a laundry list of toxic chemicals and oil wastes, such as arsenic, lead, selenium, benzene, Freon, toluene, xylene, ethylbenzene, toluene, methane, hydrogen sulfide, and other Volatile Organic Compounds typically found in oil and gasoline. (Williams, p. 2)

The DEIR fails to explain why there has not been a full site clean-up to date or any other prior mitigation measures taken to protect the public from soils gassing underneath and near the existing facilities. Nor did the DEIR discuss the results of any historic or current air quality testing within or near the existing parking lot structure and office building, which are above and adjacent to the contaminated locations. (Williams, p. 3)

Much more analysis and disclosure to the public must be made regarding the very dangerous contaminated site.

C. THERE ARE SPECIFIC ALTERNATIVES AND MITIGATION MEASURES THAT WOULD AVOID AND/OR MITIGATE THE PROJECT'S SIGNIFICANT EFFECTS

The central purpose of an EIR is to identify the significant environmental effects of the proposed project, and to identify ways of avoiding or minimizing those effects through the imposition of feasible mitigation measures or the selection of feasible alternatives. (Pub. Resources Code, §§21002, 21002.1(a), 21061.)

The DEIR fails to discuss feasible project alternatives or to propose sufficient mitigation, even though it concludes that the Project will have significant environmental impacts.

1. The EIR Failed To Adequately Discuss Feasible Project Alternatives.

The alternatives section, along with the mitigation section, is the core of an EIR. (See *Goleta Valley, supra*, 52 Cal.3d at 564.) In preparing an EIR, a lead agency must ensure "all reasonable alternatives to proposed projects are thoroughly assessed." (*San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal.App.4th 713, 717; quoting *Wildlife Alive v. Chickering* (1976) 18 Cal.3d 190, 197; Pub. Resources Code, § 21001(g) (lead agency must "consider alternatives to proposed actions affecting the environment"); *Laurel Heights I, supra*, 47 Cal.3d at 400.)

The DEIR does not properly evaluate alternatives to the proposed expansion project but rather looks only at minor schedule variations of the proposed project. These "alternatives" do not fulfill the requirements of CEQA. In addition to the required "No Project Alternative," the two other alternatives outlined in the Draft EIR are merely slight variations to the proposed project's schedule. The proposed project, with its six major components, has not been altered or changed in any way in either Alternative A or Alternative B to reduce the significant environmental impacts of the proposed Long Beach Memorial Medical Center Expansion. (Brohard, pp. 12-13)

2. The EIR Failed To Adequately Discuss Mitigation Measures

When a mitigation measure is so vague that it is impossible to evaluate its effectiveness, it may be deemed inadequate. The EIR must analyze any significant effects of the mitigation measures it describes and the mitigation measures must be feasible and enforceable. (Guidelines, §§ 15126.4(a)(1), 15126.4(a)(1)(D), 15126.4(a)(2).)

The DEIR admitted that the potential health risks and air quality impacts from the off-gassing of the contaminated site soils is a potentially significant impact. The DEIR explained that these impacts would be mitigated in the future review of the project design and clean-up. (Williams, p. 4) Leaving mitigation measures for future study is an improper mitigation measure under CEQA. See, *San Franciscans for Reasonable Growth v. City and County of San Francisco*, 151 Cal. App.3d 61, 79 (1984) (requirement that the project sponsor pay an unspecified amount of money, at an unspecified time, and in compliance with an unspecified transit funding mechanism, was an inadequate mitigation measure).

The "Voluntary Clean-Up Program Application" is also insufficient. It does not provide the sort of detailed, mandatory mitigation measures that are necessary to insure that these impacts from the site contamination are mitigated to non-significant levels. (Williams Report, p. 5) The DEIR also delegates the enforcement of these mitigation measures to other agencies. But it is the City Planning Department, as the lead agency, who must implement and enforce these mitigation measures. This is especially important for this project, since the Voluntary Clean-up Agreement had been deferred to the future and is thus not available for review and comment at this time.

Mr. Brohard also concluded that the mitigation section of the DEIR must be expanded to include cost estimates and an implementation and monitoring plan to make sure the mitigation measures and improvements are in place when required to provide safe and efficient traffic flow, and to provide appropriate on site parking. (Brohard, pp. 12-13).

As stated in the Draft EIR, the proposed project will result in numerous significant environmental impacts. Even with its numerous errors as pointed out in this report, the Draft EIR indicates significant traffic impacts from the expansion will occur at eleven nearby intersections. The Draft EIR states three of these intersections cannot be mitigated in 2008 and two additional intersections cannot be mitigated in 2014. A reduced, less intense project must be developed and subsequently analyzed in the Draft EIR as an alternative to the proposed project to reduce the significant project impacts.

Mr. Brohard listed several ways in which the eleven affected traffic intersections could feasibly be mitigated. CEQA requires that the DEIR at least study mitigation measures to potentially significant impacts. This DEIR fails to do so. The significant project traffic impacts at these three intersections in 2008 must be studied in further detail and they must be mitigated through physical improvements at these locations or through contributions to enhance transit service. (Brohard, p. 8)

There are many other mitigation measures with regard to traffic impacts that Mr. Brohard suggests should be adopted. Mr. Brohard found that even with the parking accommodations listed in the DEIR, there would still be a shortage of 681 parking spaces. (Brohard, p. 10) The DEIR states, "It would be feasible to address this shortfall through development of a parking structure at the location of the existing surface Lot K." With a shortage of at least 681 parking spaces in 2015, Brohard concludes that the Draft EIR should specifically require construction of a parking structure as a mitigation measure to address the parking shortage. (Brohard, p. 10)

Both the Construction Parking Program and the Operation Parking Program inherently assume construction of a parking structure by using portions of the capacity provided to meet the expanding parking needs of Long Beach Memorial Medical Center. However, the Draft EIR does not indicate when such the parking structure should be available for use. The parking structure completion date must be determined and added to the Draft EIR. (Brohard, pp. 10-11)

CONCLUSION

The EIR is "the heart of CEQA" and "an environmental alarm bell whose purpose is to alert the public and its responsible officials to environmental changes before they have reached the ecological point of no return." (*Laurel Heights, supra,* 47 Cal.3d at 392.)

Based on the severity of the DEIR's errors and omissions, the DEIR should be revised to address the issues identified above and recirculated to allow for public review of the substantial new information that the revised DEIR should contain. Without these revisions the DEIR is inadequate under CEQA and cannot be relied upon by the Planning Commission for approval of the Project.

Sincerely,

Jerilyn López Mendoza
Attorney/Policy Director
Environmental Justice Project Office

Enclosures

Tom Brohard and Associates

March 9, 2005

City of Long Beach
Attn: Ms. Anita Garcia, Project Manager
Department of Planning and Building
City Hall, 5th Floor
333 West Ocean Boulevard
Long Beach, California 90802

SUBJECT: Long Beach Memorial Medical Center Expansion Draft Environmental Impact Report - Traffic Comments

Dear Ms. Garcia:

Tom Brohard, PE, has reviewed various portions of the January 25, 2005 Draft Environmental Impact Report (Draft EIR) prepared by Sapphos Environmental pertaining to transportation, traffic, and parking for the Long Beach Memorial Medical Center Expansion. The December 17, 2004 Draft Traffic Impact Analysis prepared by Linscott, Law & Greenspan Engineers, Technical Appendix J of the Draft EIR, has also been reviewed. In addition, the January 25, 2005 Master Plan of Land Uses for the Long Beach Memorial Medical Center and Miller Children's Hospital was also reviewed. If the proposed medical center expansion project is approved by the City of Long Beach, about 425,000 square feet would be added over the next ten years to the existing 1,214,000 square feet of medical facilities on the 54 acre site in central Long Beach.

The Draft EIR contains a number of footnotes and references beginning on Page 3.11-1 to the November 4, 2004 Traffic Impact Analysis prepared by Linscott, Law & Greenspan Engineers. However, Appendix J to the Draft EIR contains the December 17, 2004 Draft Traffic Impact Analysis, not the November 4, 2004 version. As a result, there are several contradictions between statements made regarding transportation, traffic and parking in the Draft EIR as compared to those made in the December 17, 2004 Draft Traffic Impact Analysis published as Appendix J to the Draft EIR. As described in this report, the most significant inconsistency between the Draft EIR and the Draft Traffic Impact Analysis contained in Appendix J involves significantly different transit trip forecasts associated with the proposed Long Beach Memorial Medical Center Expansion.

As detailed throughout this report, my review disclosed many transportation, traffic and parking issues associated with the proposed expansion project have not been properly or adequately addressed. Trips associated with several project components have been incorrectly forecast in the Draft Traffic Impact Analysis and carried forward throughout various sections of the Draft EIR. The significant underestimation of project trips leads to additional significant project traffic impacts at other locations that have not been disclosed or mitigated. The use of these low trip forecasts carries through other sections of the Draft EIR as well,

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likely resulting in additional significant project impacts in the areas of noise and air quality. There are significant differences between the forecasts of transit trips presented in the Draft EIR and those contained in the Draft Traffic Impact Analysis. Project impacts on transit services have not been properly evaluated or mitigated. Significant project traffic impacts at critical intersections have been identified and subsequently dismissed without proper evaluation of suitable mitigation measures. The parking analysis fails to consider the fragmented parking supply as well as limitations on the use of specific parking areas. The parking structure, a key element of the expansion, is not identified as a mitigation measure and a firm schedule for its construction has not been provided. There are several inconsistencies between the project description of component sizes and schedules compared to those used in the analysis of parking during various phases of construction. Finally, the Draft EIR does not properly evaluate true alternatives to the proposed expansion project but rather briefly reviews only minor schedule variations for the proposed project. These "alternatives" do not fulfill the requirements of the California Environmental Quality Act.

To rectify these numerous deficiencies and inadequacies, the concerns in this report as well as those expressed by others must be carefully studied and addressed in a revised traffic impact analysis conducted as part of a thorough project reevaluation in a recirculated Draft Environmental Impact Report.

Education and Experience

Since receiving a Bachelor of Science in Engineering from Duke University in Durham, North Carolina in 1969, I have gained over 35 years of professional engineering experience, all of which has occurred in California. I am licensed as both a Professional Civil Engineer and as a Professional Traffic Engineer in California. I formed Tom Brohard and Associates in 2000 and now serve as the Contract Administrator for the Traffic Model and Circulation Element Update for the City of Huntington Beach as well as the Consulting Transportation Engineer for the City of San Fernando.

I have extensive experience in traffic engineering and transportation planning. During my career in both the public and private sectors, I served as City Traffic Engineer for the Cities of Bellflower, Bell Gardens, Huntington Beach, Lawndale, Los Alamitos, Oceanside, Paramount, Rancho Palos Verdes, Rolling Hills, Rolling Hills Estates, San Fernando, San Marcos, Santa Ana, and Westlake Village. While serving these communities, I personally conducted hundreds of investigations of citizen requests for the installation of various traffic control devices. During these assignments, I successfully presented hundreds of traffic engineering reports at City Council and Traffic Commission meetings.

During my career, I have reviewed numerous environmental documents and traffic studies for various projects. Some of my recent work is highlighted in the enclosed resume. During these assignments, I have worked successfully with several law firms and local interest groups in the review of environmental documents and traffic studies, frequently within very limited time constraints.

Brief Summary of the Project

According to Table 2.4.1-1 on Page 2-8 of the Draft EIR, the proposed expansion project of the Long Beach Memorial Medical Center includes six major components with the following building sizes and anticipated completion dates:

- Todd Cancer Institute Phase I – 83,630 square feet - September 2006
- Todd Cancer Institute Phase II – 42,300 square feet – June 2011
- Miller Children's Hospital Phase I – 124,500 square feet – January 2008
- Miller Children's Hospital Phase II – 73,500 square feet – June 2013
- Miller Children's Hospital outpatient – 80,000 square feet – May 2007
- Miller Children's Hospital link building – 20,000 square feet – June 2011

Table 2.4.1-1 indicates the proposed expansion project at Long Beach Memorial Medical Center will also include a utility trench, a 3,500 square foot central plant building, realignment of a roadway, and 2,187 parking spaces.

Traffic and Parking Issues Associated with the Expansion Project

The January 2005 Draft EIR for the Long Beach Memorial Medical Center Expansion contains numerous deficiencies and many critical transportation, traffic and parking issues have not been adequately or properly addressed. Significant errors have been made regarding trip generation, the foundation of not only the traffic impact analysis but also various other sections of the Draft EIR involving noise and air quality. Until the concerns in this letter are adequately addressed, we disagree with the conclusion in the Draft EIR that the majority of the project's traffic impacts can be mitigated to have a less than significant effect on the environment. As detailed below, the available evidence indicates that the expansion project will have significant adverse impacts that have neither been disclosed nor analyzed in the Draft EIR or the supporting traffic impact analysis.

Based upon the information provided in the Draft EIR, my review indicates the following numerous omissions, deficiencies, issues, and concerns regarding identification and mitigation of potential traffic impacts associated with the Long Beach Memorial Medical Center Expansion:

1) Traffic Analysis Misused ITE Hospital Trip Generation Data – Trip generation forecasts in the Draft EIR for the Miller Children's Hospital Phase I and Phase II projects were incorrectly calculated using trip rates per hospital bed from the Institute of Transportation Engineers (ITE) Trip Generation, 7th Edition publication. Trip rates per bed used in the Draft EIR do not apply to the type

or size of hospital use being contemplated and cannot be used to properly forecast trips to and from the Miller Children's Hospital as follows:

a) Selection of the Proper Independent Variable Is Critical – For many different land use categories in Trip Generation, 7th Edition, ITE relates the number of trips to different features of the development. These different features, called independent variables, relate daily and peak hour trips to various physical, measurable, and predictable units describing the study site or trip generator. For the hospital category, Land Use Code 610, ITE presents daily and peak hour trip rates for three different independent variables, with these including the number of beds, the number of employees, and the size of the facility per 1,000 square feet.

When facing a choice of which independent variable to use, it is always preferable to use one that does not change or vary over time, such as the square footage of the building. Using trip rates based on independent variables that could change significantly over time does not provide proper and accurate forecasts of daily and peak hour trips. For this reason alone, the traffic impact analysis should have used trip rates based upon the square footage of the proposed Miller Children's Hospital inpatient tower rather than based upon the number of beds. Furthermore, the use of trips per bed leads to a significant underestimation of daily and peak hour trips as discussed in further detail in the following paragraphs.

b) Trip Rates Per Bed Are Inconsistent with the Project Description – In describing Phase I of the Miller Children's Hospital pediatric inpatient tower, Page 2-10 of the Draft EIR states this component "...would provide approximately 129,220 square feet of new space for pediatric surgical services, imaging, lobby, newborn intensive care services, and general pediatric inpatient care services." In describing Phase II of the Miller Children's Hospital tower, Page 2-10 states "Phase II would provide approximately 86,030 square feet..." Page 8 of the Master Plan states "The increase in capacity would require 72 additional beds by year 2008, and another 92 additional beds between years 2008 and 2015 to meet anticipated demand through year 2020." Page 45 of the Master Plan states "The need to construct a new building to support pediatric inpatient services (beds and operating rooms) emerged as a priority that must be achieved by December 2007..." Using trip rates per bed is inconsistent with the project description of planned uses and services for the inpatient tower as contained in the Draft EIR and in the Master Plan.

c) Resulting Square Footage Per Bed Is Unreasonable and Illogical - If hospital beds were the only use in Phase I, then each bed in Phase I would occupy 1,795 square feet (129,220 square feet divided by 72 beds), a size equivalent to my first single family home that contained three bedrooms. If hospital beds were the only use in Phase II, then each bed in Phase II would occupy 935 square feet (86,030 square feet divided by 92 beds), about half the size of my first single family home that contained three bedrooms. The resulting square footage per bed is unreasonable and illogical as demonstrated by these calculations and comparisons.

It is my understanding that single bed hospital rooms at UCLA Medical Center are about 11 feet by 15 feet (165 square feet) and double bed hospital rooms are about 12 feet by 20 feet (240 square feet.) By using trips per bed for the expansion project, all trips associated with each of the other planned uses and services to be provided in the Miller Children's Hospital inpatient tower have been omitted from the traffic, noise, and air quality analyses in the Draft EIR. This faulty approach results in undisclosed and unmitigated impacts in each of these critical areas.

d) Size of Hospital Not Within ITE Database for Trips Per Bed – In describing limitations of the data plots contained in Trip Generation, 7th Edition, Page 14 of the User's Guide states "The plots presented in *Trip Generation* cover only the range of independent variables for which data are available. Caution should be used if extrapolating the data beyond the ranges provided, since no information has been supplied to document trip generation characteristics beyond the ranges given." However, the traffic analysis for the Long Beach Memorial Medical Center violated this principle by going beyond the range of data presented in their calculations of AM and PM peak hour trips.

As shown on the enclosures, the number of beds for the eight hospitals compiled in Trip Generation, 7th Edition Land Use Code 610 range from a minimum of 250 beds up to a maximum of 770 beds for AM and PM peak hour rates. Table 3.11.4-2 on Page 3.11-14 of the Draft EIR incorrectly extrapolates the average trip rates per bed for hospitals "off the chart" to forecast AM and PM peak trips for Miller Children's Hospital Phase I with 72 beds. Table 3.11.4-2 also incorrectly extrapolates the average trip rates per bed for hospitals "off the chart" to forecast AM and PM peak hour trips to and from Miller Children's Hospital Phase II containing 92 beds.

Trip Generation Handbook, Second Edition, an ITE Recommended Practice, was published in June 2004 to provide instruction and guidance in the proper use of data presented in Trip Generation, 7th Edition. Trip rates in this publication relate vehicle trips to different independent variables such as per 1,000 square feet. Page 9 of the Trip Generation Handbook states that "The value of the independent variable for the study site must fall within the range of data included to use either the rate or equation. Otherwise local data are needed."

Traffic forecasts in the Draft EIR for the Miller Children's Hospital incorrectly went well below the range of data provided by ITE per hospital bed for the AM and PM peak hour calculations. To remedy this error, "local data" as specified by ITE must be gathered (i.e., actual traffic count from comparable local hospitals including existing facilities at Long Beach Memorial Medical Center) or the enclosed data presented by ITE per 1,000 square feet for hospitals in Land Use Code 610 must be used.

e) <u>Draft EIR Significantly Underestimates Trips for MCH Tower</u> – As demonstrated above, it is unreasonable and illogical to forecast trips based upon the 72 beds in Phase I and the 92 beds in Phase II. By using faulty methodology, the Draft EIR has grossly understated the number of daily and peak hour trips that will be generated by these two components of the proposed expansion project. Correctly using the data presented by ITE in Land Use Code 610 for hospitals per 1,000 square feet and properly applying the fitted curve equation provided by ITE to the 215,250 square feet proposed for the inpatient tower indicates the following:

i) Phase I and Phase II of the Miller Children's Hospital containing a total of 215,250 square feet will generate 4,365 daily, 340 AM, and 385 PM trips.

ii) Phase I of the Miller Children's Hospital containing 129,220 square feet (60 percent of the total square footage of the inpatient tower) will generate 2,620 daily, 205 AM, and 230 PM trips; not 850 daily, 81 AM, and 94 PM trips shown in Table 3.11.4-2. The additional trips must be added to the Year 2008 Subtotal and analyzed in the Draft EIR.

iii) Phase II of the Miller Children's Hospital containing 86,030 square feet (40 percent of the total square footage of the inpatient tower) will generate 1,745 daily, 135 AM, and 155 PM trips; not 1,087 daily, 104 AM, and 119 PM trips shown in Table 3.11.4-2. The additional trips must be added to the Year 2014 Subtotal and analyzed in the Draft EIR.

2) <u>Draft EIR Incorrectly Omits All MCH Link Building Trips</u> – Table 3.11.4-2 on Page 3.11-14 of the Draft EIR does not include the proposed 20,000 square foot link building at Miller Children's Hospital or any of the daily or peak hour trips associated with this project component. According to Page 2-11 of the Draft EIR this building "...would contain retail spaces, offices, and retail food service for the users of the adjacent inpatient tower and outpatient building." While intended for support purposes, no restrictions have been proposed to guarantee only the uses that were identified in the project description.

Daily and peak hour trips associated with the Miller Children's Hospital link building should be estimated using the same rates as those used for the outpatient tower. Calculating trips for the link building using the data presented by ITE in Land Use Code 720 for medical and dental office buildings per 1,000 square feet indicates this facility will generate 720 daily trips, 50 AM peak hour trips, and 75 PM peak hour trips. These additional trips must be added to the Year 2014 Subtotal and analyzed in the Draft EIR.

3) Draft EIR Significantly Underestimates Expansion Trips – As discussed above, Table 3.11.4-2 on Page 3.11-14 of the Draft EIR incorrectly forecasts trips from the Miller Children's Hospital inpatient tower and omitted all trips from the Miller Children's Hospital link building. This table must be corrected to properly forecast trips for the expansion project as follows:

- ❖ In Year 2008, the expansion project will generate 8,530 daily trips, 610 AM peak hour trips, and 840 PM peak hour trips; not 6,762 daily trips, 487 AM peak hour trips, and 703 PM peak hour trips as shown in the table.
- ❖ In Year 2014, further expansion will generate an additional 3,990 daily trips, 290 AM peak hour trips, and 390 PM peak hour trips; not 2,615 daily trips, 209 AM peak hour trips, and 276 PM peak hour trips as shown in the table.
- ❖ In total, the entire expansion project will generate 12,520 daily trips, 900 AM peak hour trips, and 1,230 PM peak hour trips; not 9,377 daily trips, 696 AM peak hour trips, and 979 PM peak hour trips as shown.

Thus, the Draft EIR's calculation of trips for the proposed expansion of Long Beach Memorial Medical Center is understated by 33 percent for daily traffic, by 30 percent for AM peak hour traffic, and by 26 percent for PM peak hour traffic. The Draft EIR fails to disclose these additional trips from the project and fails to mitigate resulting significant traffic, noise, and air quality impacts.

4) Different Transit Trips Forecast in Draft EIR and Traffic Impact Analysis – Page 3.11-21 of the Draft EIR states the proposed project is forecast to generate 34 transit trips in the AM peak hour, 48 transit trips in the PM peak hour, and 459 daily weekday transit trips. Page 52 of the December 17, 2004 Draft Traffic Impact Analysis forecasts 146 transit trips in the AM peak hour, 206 transit trips in the PM peak hour, and 1,969 daily weekday transit trips.

There are significant differences between these two sets of transit trip forecasts, with those in the Traffic Impact Analysis being more than four times (430 percent) higher than those presented in the Draft EIR. With transit trips forecast as a percentage of overall vehicle trips to and from the project, the number of expected transit trips will increase even further when the trip generation forecasts for the project are corrected in response to comments made earlier in this report.

5) Impacts on Transit Service Have Not Been Evaluated or Mitigated - Without conducting any analysis of the transit impacts whatsoever, Page 3.11-21 of the Draft EIR states "...it can be concluded that the public transit system would not be significantly impacted by the proposed project." We disagree with this unfounded conclusion.

   The Draft EIR and the Draft Traffic Impact Analysis have forecast significantly different numbers of daily and peak hour trips that will be made on transit to and from the proposed expansion project. Once these forecasts are reconciled, further study must then be made to quantify the resulting transit impacts. If transit service is currently at capacity or expected to reach capacity in the study years in 2008 or in 2014, then additional transit vehicles will be required to provide the capacity to accommodate the forecast transit trips to and from the proposed project. Without identifying or quantifying the utilization or the transit capacity, it is not possible to conclude that the public transit system will not be significantly impacted by this project. If it is significantly impacted, then the Long Beach Memorial Medical Center must be required to pay its fair share to provide the additional transit capacity.

6) Significant Traffic Impacts in 2008 and 2014 Have Not Been Mitigated – Significant project traffic impacts in Year 2008 have been identified at 11 intersections in Table 3.11.5-2 on Page 3.11-25 of the Draft EIR. In describing traffic impacts in 2014, Page 3.11-26 of the Draft EIR states "...traffic associated with Phase I and Phase II of the proposed project would significantly impact the same 11 intersections identified in Year 2008 with Phase I traffic conditions." While 11 intersections are included in Table 3.11.5-2 as impacted, only ten of these intersections are listed in the section involving mitigation measures beginning on Page 3.11-26. Proposed mitigation measures at Pasadena Avenue/Willow Street must be described and added to Measure Transportation-1 on Page 3.11-27.

   In the subsequent discussions on Page 3.11-27 for 2008 and on Page 3.11-27 and Page 3.11-28 for 2014, mitigation measures for the three significantly impacted intersections of Atlantic Avenue at Willow Street, Long Beach Boulevard at Willow Street, and Long Beach Boulevard at Wardlow Road are dismissed by stating "No physical mitigation measure is feasible; any additional turn lanes would require widening and additional right of way."

   The Draft EIR has wrongfully concluded that project traffic impacts cannot be mitigated as additional traffic lanes will require additional right of way. If there are physical constraints at these three intersections that preclude adding more traffic lanes within the existing right of way, then the purchase of additional right of way must be considered and evaluated. If the purchase of additional right of way is determined to be too costly, then other mitigation measures such as construction of a grade separated intersection or the prohibition of turns must be considered. If physical mitigation measures at the intersections are not considered feasible after further evaluation, then the project must be required to contribute its fair share to improve transit service to further reduce peak hour trips associated with the project through the significantly impacted, unmitigated intersections. In sum, the significant project traffic impacts at these three intersections in 2008 must be studied in further detail and they must be mitigated through physical improvements at these locations or through contributions to enhance transit service.

Page 3.11-31 states "The impacts to five of ten intersections would not be mitigated to below the level of significance for the year 2014 planning horizon." The Draft EIR fails to identify the additional two intersections, over and above the three impacted but unmitigated intersections that result in 2008, resulting from additional project traffic from the further expansion. These two additional intersections that are significantly impacted in 2014 must also be studied in further detail and they must be mitigated through physical improvements at these locations or through contributions to enhance transit service.

7) <u>Fragmented and Restricted Parking Supply Must Be Analyzed</u> – The parking analysis in the Draft EIR fails to consider the fragmented parking supply that is spread throughout the Long Beach Memorial Medical Center. Additionally, there are restrictions limiting the use of each of the existing parking areas to specific user groups such as staff and employees, patients and visitors, and doctors. Both the fragmented and the restricted nature of parking must be considered in further analysis of parking for the proposed expansion project.

Page 16 of the Master Plan states "There are a total of 3,452 parking spaces located in 11 locations, two parking structures and nine surface parking lots throughout the Campus." Table 3.02 on Page 17 of the Master Plan indicates 3,193 parking spaces are required by the City of Long Beach based upon ratios of 2 parking spaces per bed and 5 parking spaces per 1,000 square feet. Table 3.11.4-3 on Page 3.11-16 of the Draft EIR also provides this data.

Figure 3.09 on Page 18 of the Master Plan shows the location of the 11 parking facilities together with the restrictions for parking in each lot. Table 3.11.2-4 on Page 3.11-11 of the Draft EIR provides the inventory of the 3,452 existing parking spaces at the 11 locations, and identifies 2,340 parking spaces restricted for use only by staff and employees, 937 parking spaces restricted for use only by patients and visitors, and 175 parking spaces restricted for use only by doctors.

Existing parking facilities range in size from 28 parking spaces to 1,594 parking spaces. The current parking supply is extremely fragmented, with several small capacity parking lots spread out across the Medical Center campus. Completion of the Master Plan will provide a larger parking supply, but the parking lots will remain spread out. Fragmented parking makes it extremely difficult for staff, employees, patients, visitors, and doctors to quickly locate available parking.

Table 3.03 on Page 19 of the Master Plan mistakenly identifies the parking requirements of the City of Long Beach as the existing parking demand, a very different item. Table 3.11.4-3 on Page 3.11-16 of the Draft EIR compares the existing parking supply to the City of Long Beach requirements but does not identify the true parking demand at the Medical Center. Without conducting a detailed parking study that includes both parking occupancy and parking duration in each of the parking facilities, it is not possible to identify what the true parking demand actually is or what deficiencies may exist. In some of the reserved lots, there could be a demand for more parking spaces than have been provided, especially with all parking lots being restricted to only certain user groups.

To properly establish the actual parking demand, an occupancy study of actual parking conditions at Long Beach Memorial Medical Center must be made. This study must include hourly observations of actual parking usage and the parking duration in each of the 11 parking facilities. Subsequent analysis of the data would provide actual parking demand for the Medical Center, not the amount of parking provided in relation to the City of Long Beach parking requirements. Changing the limitations and restrictions currently in place for various lots should be considered if specific restricted parking facilities have a parking demand greater than their capacity.

In planning parking needs for the expansion, a circulation contingency factor of at least ten percent should be added. The contingency factor recognizes parking areas are considered to be effectively full before they reach capacity since the time to find an empty parking space becomes excessive. The need for a contingency factor becomes especially critical when the parking supply is dispersed over a series of different restricted parking facilities as is the case with Long Beach Memorial Medical Center. The analysis of future parking needs should also consider providing additional parking as may be needed for specific user groups including staff and employees, patients and visitors, and doctors, or to eliminate the parking restrictions by user group to make all parking spaces available to all facility users.

8) <u>Parking Structure Is Required For Mitigation</u> – The parking structure, a key element of the expansion of Long Beach Memorial Medical Center, is not specifically identified as a mitigation measure in the Draft EIR. Page 3.11-19

indicates there will be a significant shortfall of parking in 2015, potentially reaching 1,215 parking spaces "...if the lease of Lots L and M could not be renewed in year 2015." Even if these two lots that provide 534 parking spaces could continue to be leased beyond 2015, there would still be a shortage of 681 parking spaces. Page 3.11-19 of the Draft EIR states "It would be feasible to address this shortfall through development of a parking structure at the location of the existing surface Lot K." With a shortage of at least 681 parking spaces in 2015, the Draft EIR must specifically require construction of a parking structure as a mitigation measure to address the parking shortage rather than to indicate it is only feasible to provide the parking structure.

9) Timing of Parking Structure Completion Must Be Determined – Table 3.11.4-7 on Page 3.11-20 of the Draft EIR shows the Construction Parking Program. This table indicates 275 parking spaces in the parking structure at Lot K would be available as part of Step C during construction of the Todd Cancer Institute Phase II building starting in July 2010.

   Table 3.11.4-8 on Page 3.11-21 of the Draft EIR shows the Operation Parking Program. This table indicates 161 parking spaces in the parking structure at Lot K would be available as part of Step B for the Miller Children's Hospital pediatric outpatient building in June 2007.

   Both the Construction Parking Program and the Operation Parking Program inherently assume construction of a parking structure by using portions of the capacity provided to meet the expanding parking needs of Long Beach Memorial Medical Center. However, the Draft EIR does not indicate when such the parking structure should be available for use. The parking structure completion date must be determined and added to the Draft EIR.

10) Parking Analysis Contains Inconsistencies – Pages 2-9 through 2-11 of the Draft EIR describe various components of the expansion project including their anticipated size and construction schedule. There are several inconsistencies between this information and the component sizes and their schedules that were used to estimate parking needs during construction beginning on Page 2-13 of the Draft EIR as follows:

   - Todd Cancer Institute Phase I – Page 2-9 indicates completion of construction in September 2006 whereas Page 2-13 uses December 2007 for completion of construction for the same component.

   - Todd Cancer Institute Phase II – Page 2-9 indicates a size of 42,300 square feet for this component whereas Page 2-13 uses 45,500 square feet for the same component.

- Miller Children's Hospital Phase I - Page 2-10 indicates a size of 129,220 square feet for this component whereas Page 2-15 uses 124,500 square feet for the same component.

- Miller Children's Hospital Phase II – Page 2-10 indicates a size of 86,030 square feet for this component whereas Page 2-15 uses 73,500 square feet for the same component.

In addition to resolving the inconsistencies between the project description and the assumptions used in the parking analysis during construction, the following additional discrepancies involving parking were noted during our review of the Draft EIR:

a) Temporary Parking Lots L and M - Sites L and M accounting for 534 parking spaces during construction activities will be leased from other property owners. It will take time to negotiate these leases and to provide suitable a parking surface on these properties. It is doubtful that these leases can be quickly executed and that the parking surface improvements can be constructed for these 534 parking spaces to be in use by July 2005 as shown in Figure 2.4.8-1A. A more realistic schedule must be developed for these two parking lots. The subsequent construction schedule must also be revised so replacement parking is available before other project components that remove existing parking are commenced.

b) Site N – As can be seen on the aerial photography used as a background for the 10 step construction process shown in Figures 2.4.8-1A through 2.4.8-1J, Site N is already being utilized as a parking lot. Table 3.11.4-6 on Page 3.11-19 of the Draft EIR assumes 121 parking spaces can be provided on this site, but parking is already being practiced at this location. Areas that are already being utilized for existing parking cannot be considered for additional parking as the Draft EIR has done.

11) Project Alternatives Are Not True Alternatives to the Proposed Project – The Draft EIR does not properly evaluate alternatives to the proposed expansion project but rather looks only at minor schedule variations of the proposed project. These "alternatives" do not fulfill the requirements of the California Environmental Quality Act.

According to Page 4-2 of the Draft EIR, the alternatives analyzed include:

- No project alternative

- Alternative A – Consists of delaying the construction start for TCI Phase I for one year to accomplish the development of six on site surface parking areas (Lot N, Lot P, Lot Q, Lot R, Lot S, and Lot T)

- Alternative B – Consists of expedited construction of the 1,700 space parking structure to be operational by January 2007

In addition to the required "No Project Alternative," the two other alternatives outlined in the Draft EIR are merely slight variations to the proposed project's schedule. The proposed project, with its six major components, has not been altered or changed in any way in either Alternative A or Alternative B to reduce the significant environmental impacts of the proposed Long Beach Memorial Medical Center Expansion.

As stated in the Draft EIR, the proposed project will result in numerous significant environmental impacts. Even with its numerous errors as pointed out in this report, the Draft EIR indicates significant traffic impacts from the expansion will occur at 11 nearby intersections. The Draft EIR states three of these intersections cannot be mitigated in 2008 and two additional intersections cannot be mitigated in 2014. A reduced, less intense project must be developed and subsequently analyzed in the Draft EIR as an alternative to the proposed project to reduce the significant project impacts.

12) Appropriate and Timely Mitigation Needs to be Provided – Page 3.11-26 of the Draft EIR states "The proposed project can be expected to pay a fair share of the construction costs to implement these mitigation measures" for 2008. Page 3.11-27 of the Draft EIR states "The proposed project can be expected to pay a fair share of the construction costs to implement these mitigation measures" for 2014. The Draft EIR must be expanded to include the following:

- Cost estimates including design, construction observation, contract administration, and construction cost for mitigation measures at each impacted intersection, including the "fair share" cost for the project.

- An implementation and monitoring plan to make sure the mitigation measures and improvements are in place when required to provide safe and efficient traffic flow, and to provide appropriate on site parking.

In sum, the Draft EIR for the Long Beach Memorial Medical Center Expansion contains significant errors and omissions as identified above in this report. The various issues and concerns outlined above must be carefully studied before reaching the conclusion this project has traffic impacts that can be reduced to insignificance. The Draft EIR must be revised and recirculated for public review and comment. If you have questions regarding these comments, please call me at your convenience.

Respectfully submitted,

Tom Brohard and Associates

Tom Brohard

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Principal

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Enclosures

Resume
ITE Trip Generation, 7th Edition – Land Use Code 610 Peak Hour Trips

Tom Brohard, PE

Licenses: 1976 / Professional Engineer / California – Civil, No. 24577
1977 / Professional Engineer / California – Traffic, No. 724

Education: BS / Civil Engineering / Duke University / 1969

Experience: 35 Years

Memberships: Institute of Transportation Engineers - Member
Orange County Traffic Engineers Council - Chair 1979-1980
American Public Works Association - Member

Expertise: Tom is a recognized expert in the field of traffic engineering and transportation planning. His background also includes responsibility for leading and managing the successful delivery of a variety of municipal contract services to numerous cities throughout Southern California for over 15 years.

Tom has extensive experience in providing transportation planning and traffic engineering services across Southern California. From 1972 through 1978, he conducted all traffic engineering investigations in the Second Supervisorial District in Los Angeles County. He has served as City Traffic Engineer/Transportation Manager/Engineer as follows:

- Bellflower 1997-1998
- Bell Gardens 1982-1995
- Huntington Beach 1998-2004
- Lawndale 1973-1978
- Los Alamitos 1981-1982
- Oceanside 1981-1982
- Paramount 1982-1988
- Rancho Palos Verdes 1973-1978
- Rolling Hills 1973-1978, 1985-1993
- Rolling Hills Estates 1973-1978, 1984-1991
- San Fernando 2003-present
- San Marcos 1981
- Santa Ana 1978-1981
- Westlake Village 1983-1994

As Interim Transportation Manager in Huntington Beach, he oversaw a staff of 20 including traffic engineers and transportation planners, traffic signal and street lighting personnel, and the signing, striping, and marking crews. Tom secured over $3.5 million in grant funding for the City and managed the initial West Orange County Rail Feasibility Study. He recently completed a detailed review of the Circulation Element of the General Plan, and now serves as the Contract Administrator for the City's Traffic Model/Circulation Element Update.

Tom Brohard and Associates

Other selected accomplishments over the last four years include the following:

Reviewed alignment studies for the extension of Lexington Drive from Cerritos Avenue to Katella Avenue, a proposed secondary highway, for the City of Los Alamitos

Reviewed the Edinger Corridor Specific Plan Traffic Analysis recommending roadway improvements to support the proposed redevelopment and intensification of adjacent land uses for the City of Huntington Beach

Conducted a complete review of the General Plan Circulation Element for the City of Huntington Beach including comparisons to the Orange County Transportation Authority's Master Plan of Arterial Streets

Provided expert witness evaluation of the traffic impacts caused by simultaneous construction of various Alameda Corridor Transportation Authority roadway and rail projects

Conducted 12 sessions of Urban Street Design Fundamentals Training for the Engineering Department in the City of Torrance

Prepared the Hacienda Road Traffic Calming Study for the City of La Habra Heights

Prepared the City Wide Traffic Safety Study for the City of Rolling Hills Estates

Prepared critique of traffic impacts identified in the proposed extension of Corona and Valley View Avenues in the City of Norco

Prepared critique of the traffic impacts identified in the Draft Initial Study and Environmental Assessment, rebuttal to responses, and testimony at public hearings before the Ventura County Board of Supervisors regarding intersection improvements proposed by Caltrans at State Route 118/State Route 34 in Ventura County for the Community of Somis

Prepared critique of The Ranch Plan Draft EIR and Final EIR for a community of 14,000 dwelling units as well as retail, office, and recreational uses, within a development area of approximately 7,694 acres in the County of Orange

Prepared critiques of the Los Angeles International Airport Master Plan Draft EIR (Alternatives A, B, and C), Supplemental Draft EIR (Alternative D), and Final EIR (Rebuttal to Responses to Comments) on behalf of the City of El Segundo

Prepared critiques of traffic impacts Identified in the Draft EIR and the Final EIR for the 2000 Avenue of the Stars Project in Century City in the City of Los Angeles, a new high rise with 825,000 square feet of office, restaurant, retail, and cultural uses

Prepared critiques of Traffic Impacts in the Draft EIR and the Final EIR for the Proposed Wal-Mart in the City of Fremont in Alameda County

Prepared critique of Draft EIR for a housing project for 2,700 students including 1,070,000 square feet of living areas and 1,900 parking spaces at Cal Poly San Luis Obispo

Hospital
(610)

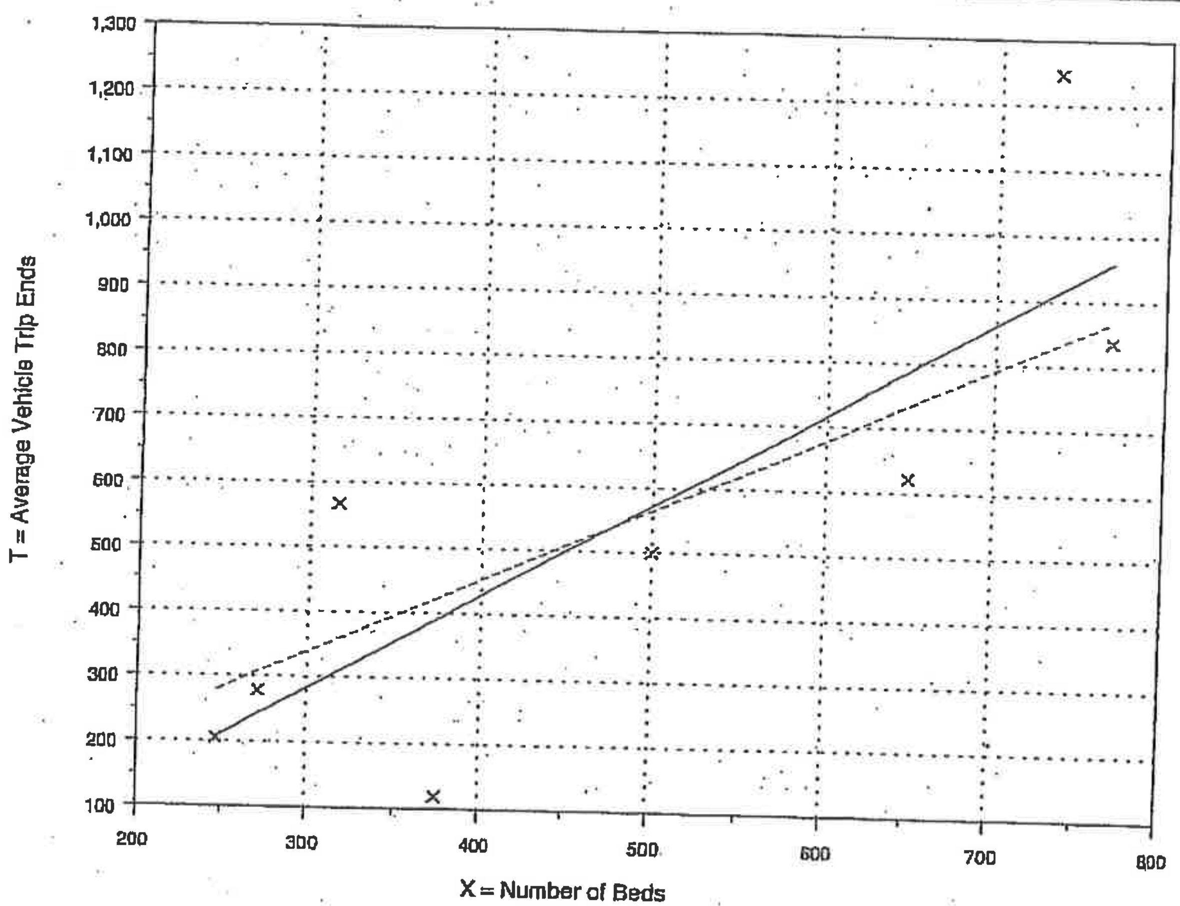
Average Vehicle Trip Ends vs: Beds
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Number of Studies: 8
Average Number of Beds: 483
Directional Distribution: 70% entering, 30% exiting

Trip Generation per Bed

Average Rate	Range of Rates	Standard Deviation
1.13	0.32 - 1.79	1.14

Data Plot and Equation



Fitted Curve Equation: $T = 1.44(X) - 149.79$

$R^2 = 0.68$

Hospital
(610)

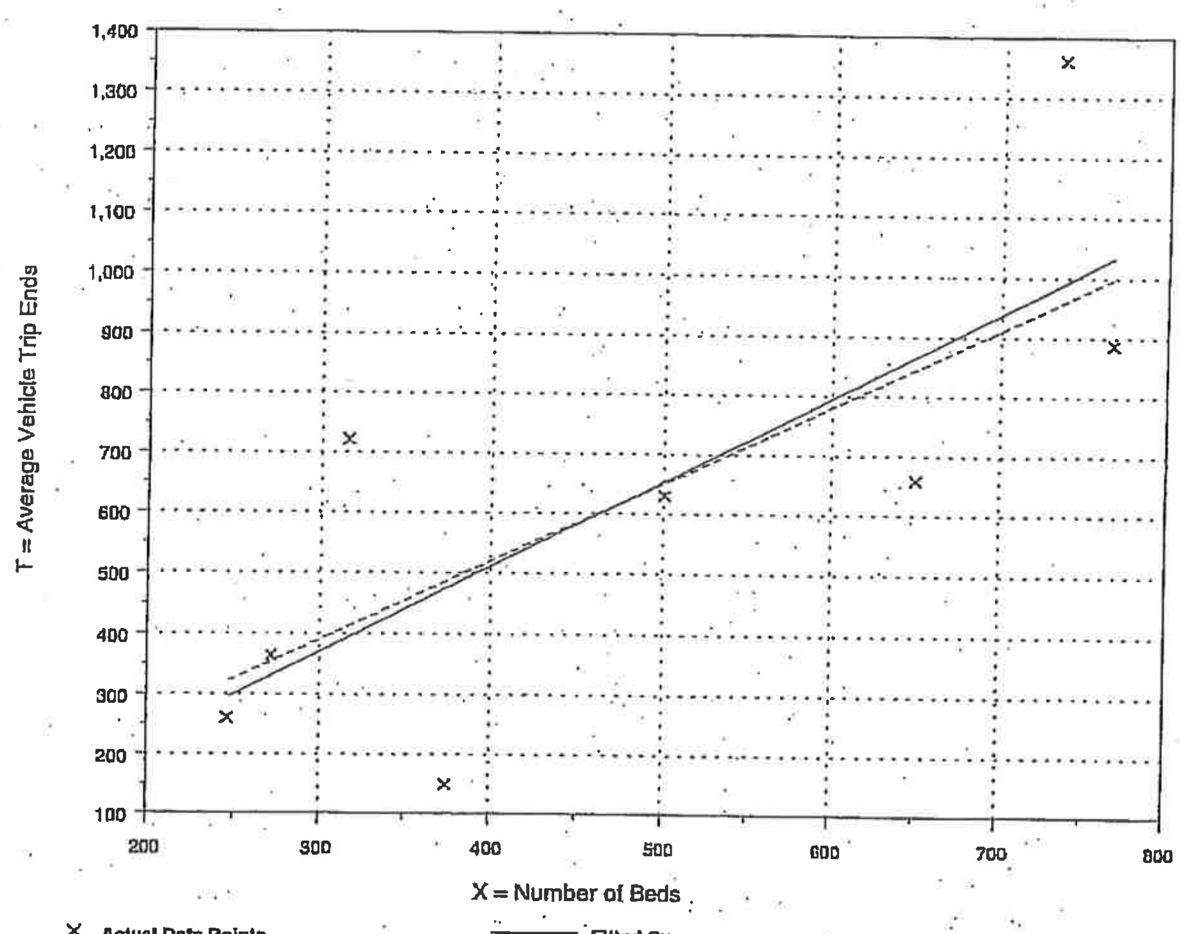
Average Vehicle Trip Ends vs:	**Beds**
On a:	**Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.**

Number of Studies:	8
Average Number of Beds:	483
Directional Distribution:	36% entering, 64% exiting

Trip Generation per Bed

Average Rate	Range of Rates	Standard Deviation
1.30	0.40 - 2.28	1.24

Data Plot and Equation



Fitted Curve Equation: $T = 1.42(X) - 54.39$

$R^2 = 0.60$

Hospital
(610)

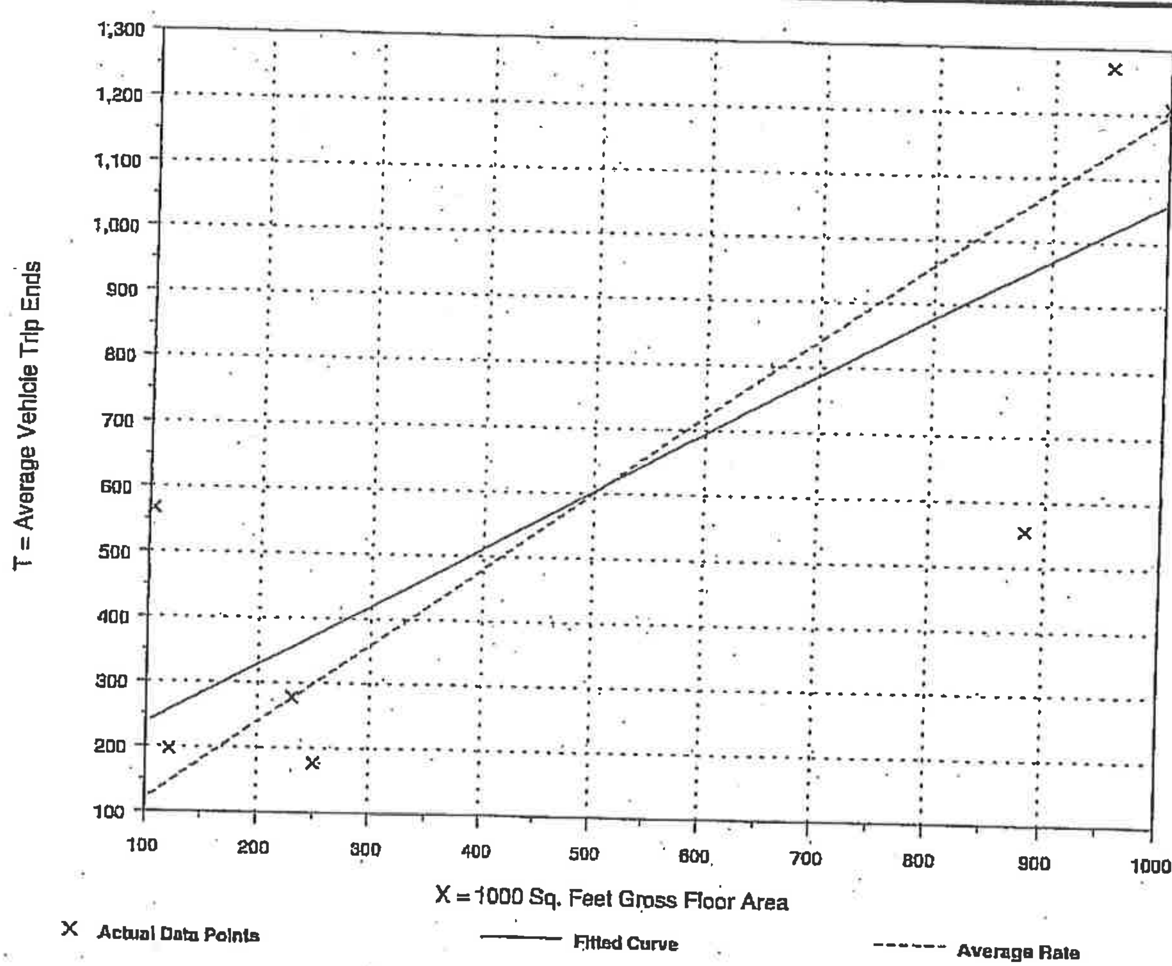
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Number of Studies: 7
Average 1000 Sq. Feet GFA: 505
Directional Distribution: 67% entering, 33% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
1.20	0.63 - 5.45	1.36

Data Plot and Equation



Fitted Curve Equation: $T = 0.91(X) + 145.24$

$R^2 = 0.68$

Hospital
(610)

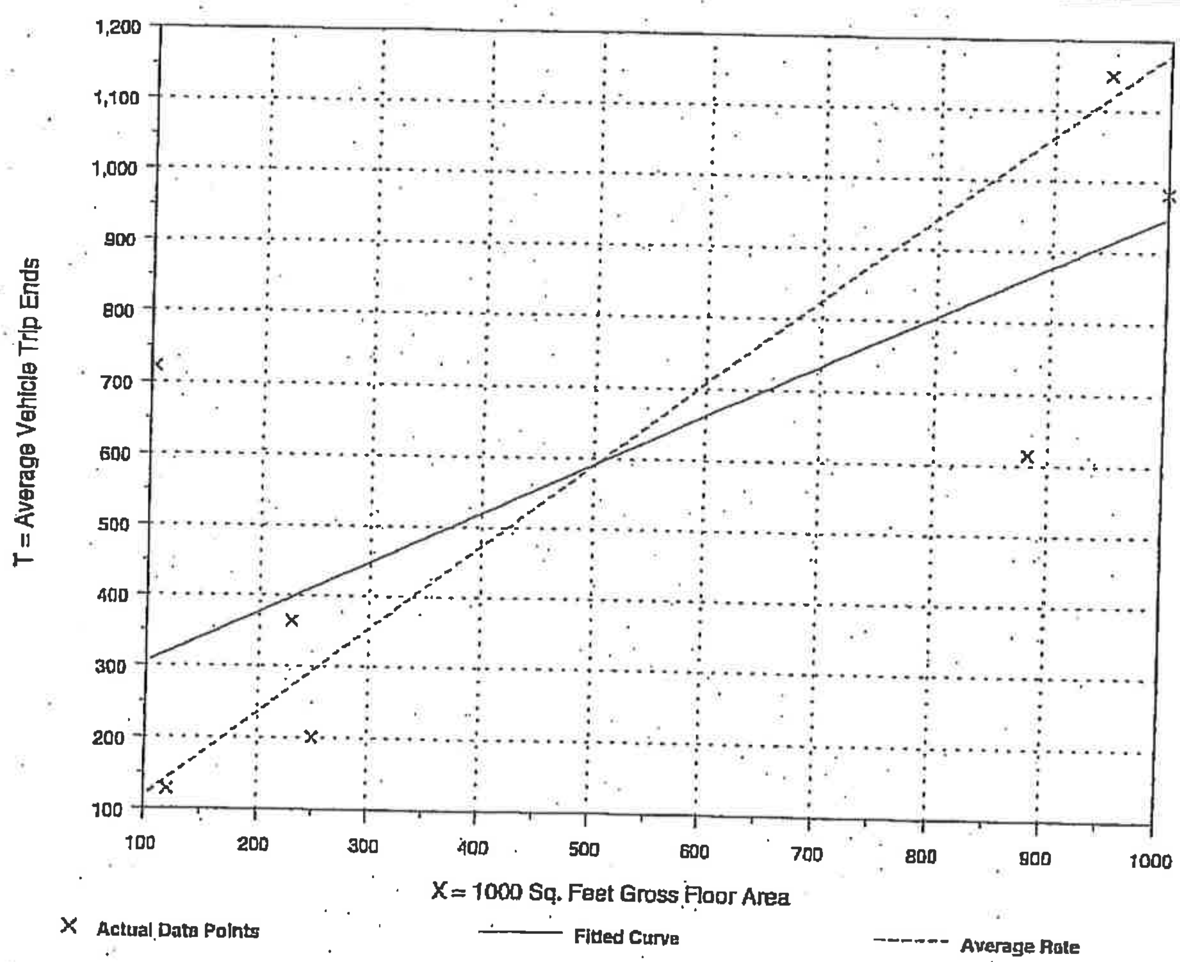
Average Vehicle Trip Ends vs:	**1000 Sq. Feet Gross Floor Area**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.

Number of Studies:	7
Average 1000 Sq. Feet GFA:	505
Directional Distribution:	33% entering, 67% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
1.18	0.70 - 6.94	1.50

Data Plot and Equation



Fitted Curve Equation: $T = 0.71(X) + 233.89$

$R^2 = 0.58$

WILLIAMS RESEARCH
John Paul Williams, Principal Investigator
INDUSTRIAL RESEARCH

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MARCH 9, 2005

City of Long Beach
Attn: Ms. Anita Garcia
Project Manager Department of Planning and Building
City Hall, 5th Floor
333 West Ocean Boulevard Long Beach, CA 90802

Dear Ms. Garcia:

Here are comments on the Draft Environmental Impact Report for the Long Beach Hospital Expansion. My resume and three relevant scientific studies on the impacts of increased air pollution follow.

Yours,

John Williams

EXECUTIVE SUMMARY

The project site for the Long Beach Hospital Expansion is heavily contaminated. The DEIR failed to fully analyze and disclose all information on the likely impacts of constructing and operating a hospital expansion at a contaminated location.

The expansion will cause and contribute to significant adverse air quality impacts, and health risks. The air quality impacts will result from the increased traffic, the construction activity, the uncovering and disturbance of contaminated soils at the site, and the operation of new air pollution sources at the facility. The DEIR does not offer sufficient review of, and mitigation for these impacts.

The DEIR for the Long Beach Hospital expansion fails to adequately assess the potential impacts from the large increases in traffic to and from the facility. The DEIR does not provide a reasonable analysis of mitigation measures for these traffic increases.

The hospital expansion will not comply with several elements of the City's General Plan. The DEIR failed to discuss this important subject in sufficient depth.

Although the DEIR conceded that the air quality and traffic impacts would be significant and adverse, the DEIR did not sufficiently analyze potential mitigation measures before concluding that overriding considerations would be adopted for those impacts, rather than providing adequate mitigation.

SITE CONTAMINATION

The expansion site is riddled with an unknown number of old oil wells, many of which are improperly abandoned, and some of which have not been located. The site is also transected by an abandoned "ravine" landfill. Portions of the project will be constructed over the site of the former Woolner Oil Company oil field waste disposal site. [1] The site soils are tainted with a laundry list of highly toxic chemicals and oil industry wastes, many of which are present at elevated concentrations that exceed regulatory thresholds such as the Residential Preliminary Remediation Goals.

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[1]Voluntary Cleanup Program Application, p A-2.

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The contaminants already discovered on site include arsenic, lead, selenium, and benzene, Freon, toluene, xylene, ethylbenzene, toluene, methane, hydrogen sulfide, and other Volatile Organic Compounds typically found in oil and gasoline.

The developer, Long Beach Hospital, has apparently been aware since 1991 that the expansion site is contaminated with these chemicals and metals. The DEIR fails to explain why a full site clean-up was not instigated in 1991, in response to the Engineering reports that found contamination in connection with the proposed construction and operation of the Children's Medical Office Building at Atlantic Avenue and 28th Street and the proposed parking structure between Long Beach Blvd. And 27th and 28th Street. (Law/Crandall, Inc., October 8 and 17, 1991).

Although the developer also became aware of the site contamination during the prior construction of the existing parking lot structure and office buildings, the DEIR did not provide any information about any mitigation measures that were implemented to protect the public from soils gassing underneath and near that existing parking structure, which is on the site of the proposed acute or pediatric inpatient lower building, or at the office building,

Nor did the DEIR discuss the results of any historic and current air quality testing within or near the existing parking lot structure and office buildings, which are above and adjacent to contaminated locations. These testing results are very important because any results would provide actual validation of the computer modeling that the DEIR used to theorize the probable levels of toxic gasses that patients and staff will breathe in the proposed buildings.

If there were no mitigation measures taken to protect the public from airborne gasses, and there was no monitoring of air quality at the existing parking structure and office building near the existing Miller Children's Hospital, the DEIR should plainly state why these mitigation measures and monitoring were not conducted, especially since mitigation measures are apparently in place at the existing Miller's Children's Hospital.

DEIR FAILED TO DESCRIBE THE EXISTING METHANE MITIGATION SYSTEM

This monitoring system may have been installed in reaction to the contamination discovered on the site in 1991. For instance, the SCS Engineering report issued in

2004 stated that the existing Millers Children Hospital building has a methane mitigation system. It is very important for the DEIR to provide reviewers with the full details about the operations of any current methane mitigation system, since the DEIR proposes a similar mitigation system for the hospital expansion that is describe din the DEIR.

However, the DEIR fails to fully discuss the results of the existing methane mitigation system, In fact the mere existence of ths system is revealed in a referenced engineering report, not in the text of the DEIR. The DEIR should have fully described the details of the existing system, including but not limited to the levels of methane and other gasses that are present in the soils beneath the mitigation system, the types of vapor controls used in the current system (sheets of plastic, other methods of sealing the building basements and foundations, venting mechanisms) and any testing results showing the existing levels of methane and other gasses within the current building basements and rooms, and a description of the pollution removal efficiency of the existing mitigation system.

FAILURE TO ADEQUATELY DISCUSS THE RESULTS OF THE 1991 SITE INVESTIGATION

ABANDONED WELLS

Portions of this site were previously disturbed during prior construction activity of a parking lot and medical office building at and near 2801 Atlantic Avenue, among other actions. The 1991 Engineering Report that was conducted prior to this construction admitted that the long Beach Health Department had received evidence of contamination at the site in 1989, and that at least three oil wells, abandoned prior to 1954, were in this site to be developed. The engineering Report recommended that these wells be located and abandoned in compliance with the current procedures, to reduce health risks. The Report also stated that "There is a definite methane potential beneath the site ... there is a possibility that additional abandoned oil wells not shown on DOG maps ... may be encountered during site development." (P, 26-7)

The DEIR failed to discuss any details of how these abandoned oils wells and the related contamination were dealt with at the time of the construction of the office building and parking structure. The DEIR does not disclose whether those wells were in fact located, and abandoned in compliance with current regulations. Since the DEIR claims that abandoned wills under the MCH "shall" be identified and properly abandoned, it is possible that the developer did not comply with the 1991 Engineering Report's directive to properly locate and abandon those old wells.

HYDROCARBON LEVELS

The actual text of the 1991 Engineering Report states that soils testing at that time revealed hydrocarbon levels as high as 190,000 milligrams per kilogram of total fuel hydrocarbons, at 5 ½ feet below the surface. Testing for organic vapors at that site also revealed detectable levels of vapors, including benzene, ethylbenzene, toluene, and total Xylene.

The DEIR claimed that "The maximum detected concentration of TPH as diesel and heavy hydrocarbons was 49, 700 mg/kg taken near the corner of Atlantic Avenue and Columbia Street (p. 3.5-7) The DEIR failed to resolve the conflict between its claim that 49,700 kg/mg was the highest concentration of hydrocarbons detected, and the 1991 Engineer Report results of 190,000 mg/kg of total fuel hydrocarbons, also discovered in the vicinity of the proposed MCH expansion.

This information is important because this particular area will host the new MCH pediatric impatient tower, the central plant, the Bulk Oxygen Enclosure, and the utility trench.

However, the DEIR text did not mention that the MCH site had been investigated during 1991. This study was revealed only in a footnote. As stated above, the DEIR did not disclose all of the results of the contamination that was uncovered in the 1991 investigation.

CONTAMINATION HAZARDS MITIGATION

The DEIR admitted that the potential health risks and air quality impacts from the off-gassing of the site soils is a potentially significant impact. The DEIR explained that these impacts would be mitigated by the future review of the project design and clean-up, by various agencies such as the Long Beach Health Department, The Department of Toxic Substances Control, and the South Coast Air Quality Management District, (mitigation Measures 1 through 15, pp 3.5-14 thru 17), including but not limited to venting systems and vapor barriers, (Measures 5 to 7), as required by the Voluntary Clean-Up Agreement with DTSC.

VOLUNTARY CLEAN-UP PROGRAM APPLICATION

During the public comment period on the DEIR, a DEIR reviewer sought further information on the Voluntary Clean-up Agreement. The County referred the reviewer to one of the DEIR consultants, who gave the reviewer a seven-page Voluntary Clean-up Program "Application," that also contained 3 marked up site aerial photographs.

The Voluntary Clean-up Application did not apparently reveal to the supervising agencies that the new Pediatric Outpatient building will be constructed within the contaminated site along Atlantic Avenue that is designated as "OU1." Nor did the Application mention that 190,000 mg/kg of total fuel hydrocarbons were present in the vicinity of the proposed MCH expansion.

The Application did not plainly state that a membrane barrier and a venting system shall be installed to protect hospital patients and staff from the release of airborne contaminants from the tainted soils beneath and near the proposed Todd Cancer Institute expansion.

None of the additional mitigation measures described in the DEIR (structure surveys, handling and storage requirements, toxic disclosure, and contractor requirements) were described in the Application.

The very limited information in this seven-page Application do not provide the sort of detailed, mandatory mitigation measures that are necessary to insure that these impacts from the site contamination are mitigated to non-significant levels. For these reasons the DEIR cannot rely on the conditions in the Application to mitigate the site contamination health risks to non-significance.

The DEIR also delegates the enforcement of these mitigation measures to other agencies, the air and water quality board and district, and the Department of Toxic Substances Control, among others. But none of these agencies are identified as lead agencies for the CEQA review of this project. The lead agency is the City of Long Beach Department of Planning. The City Planning Department is obligated, under CEQA, to implement and enforce these mitigation measures. The City is not allowed to delegate its CEQA enforcement responsibilities to some other non-lead agency which may enforce a mitigation measure sometime in the future. (Sunstrom v. County of Mendocino, 248 Cal. Rptr. 352) This is an especially important issue regarding this project, since the Voluntary Clean-up agreement is not available for review and comment at this time, and there are no guarantees or obligations that the Clean-Up Agreement will contain any, much less all of the mitigation measures suggested in the DEIR.

Finally, I strongly suggest that the Mitigation Measures mandate that the building interiors be sampled frequently for toxic air contaminants and methane, to insure that the vapor barriers and venting are working as designed,

AIR QUALITY IMPACTS

The Table 3.2.4-4 on page 3.2-15 of the DEIR shows the project operations will cause significant adverse air pollution impacts. This Table is based largely on the predicted increases in vehicle traffic to and from the expanded hospital. However, a traffic expert, Tom Brohard, has carefully reviewed the DEIR's traffic predictions, and his calculations indicate that the DEIR has underestimated the traffic impacts. Brohard's report states, for instance, at page 6 that Phase I of the MCH-generated traffic trips will actually be 300% higher than the estimates in the DEIR. The total new vehicle trips for the successive phases of project are underestimated by 25-50%. The total expansion project traffic impacts will be 12,520 daily trips, which is over 33% more than predicted in the DEIR,

Brohard's report pointed out that these miscalculations of the traffic impacts have a cascading impact on many other of the DEIR's conclusions, including but not limited to the predicted air quality and noise impacts.

TRAFFIC RELATED AIR QUALITY IMPACTS SHOULD BE CORRECTED

One immediate cascading impact is that the air emissions impact totals in the Table on page 3.2-12 will actually be about 1/3rd higher than what is currently indicated in that table. The corrected air quality impact figures should show approximate increases as follows:

(All figures in lb/day)

CO	PM-10	NOX	ROG
104	19	10	8

The traffic increases, as predicted by Brohard, will also cause localized traffic congestion and related air quality impacts that were not predicted in the DEIR. This is because the DEIR used flawed traffic assumptions that produced predictions of lower traffic impacts than should be expected.

Brohard's report, in the section titled Fragmented and Restricted Parking Supply Must be Analyzed, also pinpointed several flaws in the analysis of the impacts of the project's failure to provide sufficient parking, and the impacts of the fragmented nature of the parking lots at the project site,

For instance, the DEIR did no provide an adequate description of its traffic air impacts methodology that clearly demonstrated that it considered the localized air quality impacts caused by many vehicles daily, circling the hospital, looking for unavailable and scarce parking places that are scattered at eleven obscure locations. Thousands of additional vehicles, running at low or at idling speeds, on the roads and parking lots in and near the hospital grounds, will produce tailpipe emissions that will cause and contribute to ground level concentrations of conventional and toxic air pollutants.

POTENTIAL FOR TRAFFIC AIR EMISSIONS HOT SPOTS NOT STUDIED

The DEIR admitted that the increased traffic will cause greater congestion at eleven nearby intersections. However, the DEIR did not model the potential for localized increases of air pollutants, or "hot spots," at and near those intersections. The potential for these hot spots is incrementally greater, given the recent recalculations by Brohard which show a 33% greater increase in traffic than was predicted in the DEIR.

The DEIR did not provide a clear description of the air quality standard status of the project site. The Table on 3.2.2-1 seemed to indicate that the project vicinity does not comply with the National Ozone Standards, or with the State PM-10 Standards, or with the National PM-2.5 Standards. For this reason, the project's predicted increases in emissions of PM-10, NOX and ROG (Ozone precursors), and PM-2.5 should be considered significant, since the new emissions either exceed the significance criteria, and/or are a portion of an undefined "considerable"net increase of a pollutant for which the project area is in non-attainment.

CONSTRUCTION AIR QUALITY IMPACTS

The DEIR also stated at page 3.2-8 that air quality impacts on sensitive receptors would also be considered a significant impact. One measure of the significance of a project's air pollution is the impact on sensitive receptors. The hospital site itself is a sensitive receptor. The total increase of over eighty tons of additional air pollutants from the increased traffic from thousands of additional vehicle trips, along with the hospital's directly emitted air pollution is a potentially significant impact on this sensitive receptor. However the DEIR never considered, calculated or discussed, whether or not these operational increases in air pollutants were a significant impact.

The DEIR asserted that the construction emissions would be "greatly dispersed" before reaching the patients at the inpatient tower. This assertion was never supported with air quality impact modeling.

The DEIR also attempted to dismiss the impacts of the construction impacts on the nearby patients at the existing facility, by claiming the impacts were short-term. This conclusion, which was not accompanied by air quality modeling, conflicts with the many recent air quality studies that included examination of emergency room admissions, which clearly showed a correlation between emergency room admissions, and short-term exposure to elevated levels of air pollutants.[3]

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[3]See, for instance: "Particulate Air Pollution and Hospital Emergency Room Visits for Asthma in Seattle." American Review of Respiratory Disease. Schwartz, Slater, Larson, Pierson, and Koenig. V. 147, pp 826-831, 1993.

"Air Pollution and Daily Mortality in Birmingham, Alabama." American Journal of Epidemiology. Joel Schwartz. Vol. 137, No. 10, 1993. See particularly figure 6, page 1145 for an illustration of how any increase in PM10 correlates to increased deaths.

"Air Pollution and Daily Mortality in Steubenville, Ohio." American Journal of Epidemiology. Joel Schwartz and Douglas Dockery. Vol. 135, No. 1, 1992.

"Increased Mortality in Philadelphia Associated with Daily Air Pollution Concentrations." American Review of Respiratory Disease. Schwartz & Dockery. 145:600-604. 1992.

"Pulmonary Function and Ambient Particulate Matter." Archives of

These recent studies, which were conducted in many cities and involved the analysis of thousands of hospital records, concluded that a slight increase in concentrations of PM-10 and other pollutants for even a single day, at levels that are far below the air quality standards, would produce a corresponding increase in emergency room visits, and in the death rate, among the affected populations. Generally, the PM-10 studies showed that an increase of just 10 ug/M3 in PM-10 would translate into a .5% increase in the affected population's death rate. A one-day increase in PM-10 levels would also show up as increased rates of emergency room admissions for asthma, heart and lung-related ailments.

A March, 2005 of four million emergency room admissions showed that a 3-day moving average increases of just 1 ppm for CO, and 20 ppb in NOx, correlate with a 2.9-3.5% increase in heart disease related emergency room visits. [3]

The DEIR failed to demonstrate that the construction activity and traffic increases would not produce increases in air emissions which equal or exceed these increases which have demonstrated health impacts.

Several additional air emissions mitigation measures have been implemented on other construction projects, such as the Salton Sea project under CEC authority. Those measures included mandatory usage of only modern, low emissions diesel engines on heavy equipment that meets current CARB or EPA certified standards for off road equipment, requirements that diesel equipment must use catalyzed diesel particulate "soot" filters that achieve the maximum control efficiencies,

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Environmental Health. Chestnut, Schwartz, Savitz, and Burchfiel. May/June 1991 (Vol. 46 (No.3) p 135-144.

"Particulate Air Pollution and Daily Mortality: A Synthesis." Schwartz. Public Health Review 1991/92; 19:39-60/

[3]Peel, Tolbert, Klein, Metzger, Busico, Flanders, Todd, Mulholland, Ryan, Frumkin. "Ambient Air Pollution and Respiratory Emergency Department Visits." Epidemiology. March 2005. Volume 16(2). Pp 164-174. "Ambient Air Pollution and Cardiovascular Emergency Department Visits." Epidemiology. January 2004. Volume 15(1). Pp 46-56.

twice-daily sweeping of nearby paved streets, posting of a toll free number for complaints about noise and dust problems and a promise of a 24-hour response time to complaints, and purchases of emissions reduction credits.

The DEIR did not discuss the Hospital's current air emissions from its boilers, heaters, and other process equipment. It is possible that add-on pollution controls such as SCR on the Hospital's existing combustion sources could yield emissions credits.

DIESEL FUMES

The intense construction activity at the site will include the operation of many pieces of heavy-diesel-powered equipment. This equipment operation will cause elevated levels of diesel emissions on the hospital grounds and vicinity. The State of California recently determined diesel emissions are a highly toxic air pollutant. The DEIR fails to establish that the elevated levels of diesel emissions, from the daily operation of dozens of pieces of heavy equipment and haul trucks will not exceed thresholds of significance at this sensitive receptor; the hospital itself.

QUESTIONS ABOUT THE DUMP TRUCK HAULING FIGURES

The Table 2.4.8 2-1 states that during construction of TCI Phase I, which is roughly 80,000 square feet, there would be only 280 dump truck trips. That is only 140 round trips which would transport about 15 cubic yards per trip, or 2100 total yards or 56,700 square feet of material. This seems like a small amount of dump truck hauling for an 83,630 square foot building. Apparently LBM does not plan to haul away any, or a very small amount only, of the contaminated soils beneath TCI Phase I.

Likewise, TCI Phase II, which is only half as big, will produce 155 dump truck trips. Apparently LBM plans to leave all or most of the contaminated soils in place on the site. These amounts of dump truck trips would only remove a few inches of soil from beneath the proposed building footprints. If the contractor uncovered additional contamination, which is likely, then additional soils will have to be hauled off site and clean fill brought in. That project change would result in additional, unpredicted truck trips and the resulting increases in noise, traffic congestion, and diesel emissions. That possibility was not explored in the DEIR.

TRAFFIC MITIGATION

The main part of the hospital's plans to reduce this increased traffic is to put in bicycle racks and to make bus schedules available. This is clearly inadequate mitigation for the vast increases in the project-related traffic, as described by Brohard. In sharp contrast, the DEIR for the UCSF Mission Bay expansion said that UC already has several transportation mitigation measures already in place, including, a program to promote shuttle service, ride-sharing, and bicycle programs.

In contrast, the San Jose Regional Medical Center DEIR recommends several mitigation measures to reduce significant adverse traffic impacts at page 68. These measures include implementation of a carpool/vanpool/ridematching program, provision of vanpool vehicles, provision of on-site services for employees such as a cafeteria, banking center, etc., provision of on-site child care, or development of off site child care within walking distance, an incentive program for transit use, providing preferential parking for alternative-fueled vehicles, provide electrical vehicle charging stations, implementation of a parking cash-out program for employees (non driving employees receive transportation allowance equivalent to value of subsidized parking), construction of transit facilities such as bus turnouts, benches, etc., and design and location of buildings to facilitate transit use.

All of these mitigation measures, which are either in place or are actively under consideration for implementation at other hospitals, should have been carefully and comprehensively discussed in the DEIR regarding the proposed Long Beach Memorial expansion.

LAND USE

The DEIR at 3.2-4 lists the City's General Plan regarding traffic and air pollution. Since the hospital conflicts with the goal of reducing peak-hour traffic congestion you it does not comply with that Plan element. On page 3.2-5, several other similar Plan goals are listed with which Long Beach Memorial will not comply, including:

Action 2.1.2.2--Promote trip reduction programs with carpool incentives, vanpools, telecommuting, and free transit passes

2.4.1.3 (new development should encourage travel by carpool, vanpool, transit, bicycle, and foot),

2.3.1.10 employer participation in regional transit voucher program

5.1.5 and 5.2.1–The demolition of nearby residential housing will not comply with these goals of restoring the jobs to housing balance and encouraging infill development near activity centers, and location of housing adjacent to employment centers. .

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QUALIFICATIONS

I have been involved in the permitting and reviews of federal and state environmental impact statement/reports, and environmental reviews and permits for a variety of industrial facilities, for eighteen years, throughout the West and Northwest. I have a BA degree in history from the University of California at Berkeley, and I am a member of the Northwest Chapter of the Air and Waste Management Association.

Over the last 18 years, on behalf of law firms, environmental and public interest groups, companies, and individuals, I have reviewed environmental assessments and permit applications for many different facilities that were regulated under CEQA, NEPA or SEPA.

When I was a paralegal for the Adams & Broadwell law firm in Northern California in the late 1980s, I participated in the review of scores of environmental reviews of commercial developments, resource extraction projects, power plants, chemical plants and refineries throughout California.

My participation in the CEQA/NEPA environmental and permit review of the Amax Hayden Hill Gold Mine in California was a factor in an enforcement action and consent decree by the Federal EPA, and a resulting $300,000 fine against the mine, and additional mitigation requirements including payments to local agencies.

My participation in the review of the Cal Sierra dredge and the Western Aggregates gravel mine, both in Yuba County, has led to the issuance of several notices of violation against those mines, and significant new restrictions in their Waste Discharge Requirements.

I also revealed to the Water Quality Control Board that the Silica Resources processing plant east of Marysville, and the Vulcan mine southeast of Sacramento, were operating without waste discharge requirements. This resulted in issuances of notices of violations and the impositions of WDRs on these facilities.

My research for private parties who sought review of the Sierra Pacific sawmill near Aberdeen, Washington, led to the facility being fined $10,000 for air permit violations.

My assistance for private parties to prepare comments on the Chehalis, Washington natural gas fired facility helped lead to a 70%, or 520 ton/year reduction, in that power plant's permitted nitrogen oxides emissions, and a 90% reduction in water usage.

My review of the Portland, Oregon gasoline tank farms, assisted environmental groups in forcing installation of vapor recovery on several of those facilities, and a reduction of about 600 tons per year of toxic Volatile Organic Compounds in the Portland air shed.

I have participated in environmental assessments and air and water permit reviews of the following facilities, on behalf of a variety of private clients and environmental groups. Here is a list of projects for which I reviewed the environmental documents and/or permits.

GRAVEL MINES AND PLANTS

Bettencourt, Merced, Ca.
Brisbane Recycling, CA.
Bud Plant, Yuba Goldfields, Ca.
Calaveras Materials, Fresno, California
Deardorf, Modesto, California
Don Chapin Quarry, Hollister, Ca.
Desert Aggregates, Tulare County
Garcia Gravel, Timbuctoo, Ca.
Gilt Edge Tract, Yuba County, Ca.
Granite Rock, Santa Cruz County, Ca
Kaweah River Rock, Tulare County
Jaxon Baker, Merced, Ca

MBI Cement plant, Colfax, Ca
River City Aggregates, Sacramento County, Ca
Vulcan, Sacramento, Ca
Terra Blanca, Tulare, Ca
Silica Resources, Marysville, California
Western Aggregates, Marysville, California
Cadman, Snohomish, Washington

GOLD AND COPPER MINES-CALIFORNIA

AMAX Hayden Hill Mine, Lassen County, California
Cal-Sierra, Yuba Goldfields
Glamis Gold, Imperial County
Homestake Mine, Lake County
Kinross, Timbuctoo, Ca
Mesquite Mine, Imperial County

PIPELINES

Tuscarora Pipeline, Oregon, California, Nevada
PGT Pipeline expansion, Washington, Idaho, Oregon
Olympic Pipeline, Washington
Coos County Pipeline, Oregon
NW Natural Mist Expansion, Oregon

POWER PLANTS

Corn Products, Stockton, Ca.
Cogentrix power plant, Oregon
Turner Energy, Oregon
Avista power plant, Longview, Washington
BP, Bellingham, Washington
Chehalis Power, Washington
Goldendale Power, Washington
Plymouth Power, Washington
Sumas II power plant, Washington
Tenaska, Bellingham, Washington
Tenaska II, Frederickson, Washington
Cogentrix, Rathdrum, Idaho
Reliant, Phoenix, Arizona

Neil Simpson II, Wyoming
Kootenai, Rathdrum, Idaho
PPL/Starbuck, Wa.
Cogentrix, Mercer Ranch, Wa.
Wanapa, Hermiston, Oregon

OTHER METAL MINES

Newmont, Elko, Nevada
Denton-Rawhide, Nevada
Homestake Gold Mine, Nevada
Kennecott, Salt Lake City
Cortez, Nevada
Jerritt Canyon, Nv
Lone Tree, Nv
Twin Creeks Nv
Mule Canyon, Nv
Florida Canyon, Nv
Magma, Nv.
Wickensburg, Arizona
Carlotta, Arizona
Kinross, Salem, Oregon
Pogo, Fairbanks, Alaska
Crown Jewel, eastern Washington
Black Pine, Idaho
Stibnite, Idaho
Kinross, Idaho

HYDROELECTRIC

Skagit and Nooksack River Basin– Sixteen Hydroelectric plants, Washington
Timothy Lake, Oregon
Irene Creek, Northwest Washington
Warm Creek, NW Washington
Clearwater Creek, NW Washington
Hancock Hydro, King County, Wa.

COMMERCIAL

TrendWest Resort, Ellensburg, Washington

Mt. Rainier Resort
Wal-Mart, Longview, Washington
Bi-Mart, Clark County, Washington

INDUSTRIAL FACILITIES-WASHINGTON

ECO-NOBEL Chlorine plant, Moses Lake, Washington
Pacific Rim Ethanol, Moses Lake, Washington
Morton Chemical, Elma, Washington
Weyerhaeuser pulp mill expansion, Longview, Washington
General Chemical, Washington
Frito-Lay, Washington
Sierra Pacific sawmill, Greys Harbor, Washington
Wilder Asphalt Plant, Olympia, Washington

OTHER INDUSTRIAL FACILITIES

Steel Dynamics Mill, Whitley County, Indiana
Potlatch Paper, Lewiston, Idaho
Fletcher Paper, Tucson, Arizona
Federal Mogul, Indiana

INDUSTRIAL FACILITIES-OREGON

Cascade Grain ethanol plant, Oregon
James River Paper, Wauna, Oregon
Pope & Talbot Paper, Halsey, Oregon
Boise Cascade paper mill, St Helens, Oregon
US Gypsum, Rainier, Oregon
Korpine, Bend, Oregon
Willamette Pulp Mill, Oregon
Duraflake, Oregon
Custom Products, Oregon

Lippincott Williams & Wilkins

EPIDEMIOLOGY

Ambient Air Pollution and Cardiovascular Emergency Department Visits.

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Abstract:
Background: Despite evidence supporting an association between ambient air pollutants and cardiovascular disease (CVD), the roles of the physicochemical components of particulate matter (PM) and copollutants are not fully understood. This time-series study examined the relation between ambient air pollution and cardiovascular conditions using ambient air quality data and emergency department visit data in Atlanta, Georgia, from January 1, 1993, to August 31, 2000.

Methods: Outcome data on 4,407,535 emergency department visits were compiled from 31 hospitals in Atlanta. The air quality data included measurements of criteria pollutants for the entire study period, as well as detailed measurements of mass concentrations for the fine and coarse fractions of PM and several physical and chemical characteristics of PM for the final 25 months of the study. Emergency department visits for CVD and for cardiovascular subgroups were assessed in relation to daily measures of air pollutants using Poisson generalized linear models controlling for long-term temporal trends and meteorologic conditions with cubic splines.

Results: Using an a priori 3-day moving average in single-pollutant models, CVD visits were associated with NO_2, CO, $PM_{2.5}$, organic carbon, elemental carbon, and oxygenated hydrocarbons. Secondary analyses suggested that these associations tended to be strongest with same-day pollution levels.

Conclusions: These findings provide evidence for an association between CVD visits and several correlated pollutants, including gases, $PM_{2.5}$, and $PM_{2.5}$ components.

Ambient Air Pollution and Cardiovascular Emergency Department Visits

Kristi Busico Metzger,[*†] *Paige E. Tolbert,*[*†] *Mitchel Klein,*[*†] *Jennifer L. Peel,*[*†] *W. Dana Flanders,*[*] *Knox Todd,*[‡] *James A. Mulholland,*[§] *P. Barry Ryan,*[†] *and Howard Frumkin*[†]

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Despite evidence supporting an association between ambient air pollution and cardiovascular health, much remains to be understood about the roles of specific pollutants individually and in combination. Most of the information on the association between particulate matter (PM) and cardiovascular morbidity is based on epidemiologic studies using PM mass.[1–13] However, less is known about the specific physical or chemical characteristics of PM that could be responsible for adverse health effects, because these characteristics vary by source, geographic location, season, and concentrations of gaseous copollutants.

To examine the physicochemical components of PM that could be associated with the observed health associations, an innovative air quality monitoring station was installed near downtown Atlanta, Georgia. This monitoring station, operated by the Aerosol Research and Inhalation Epidemiology Study (ARIES), is collecting detailed information on particle composition and physical characteristics.[14] Data from this station are available from August 1, 1998, to August 31, 2000. The present study is one of several on the cardiovascular and respiratory health effects of ambient air pollution in Atlanta being undertaken by this Emory investigative team, collectively referred to as the Study of Particles and Health in Atlanta (SOPHIA). To investigate the association between ambient air pollution and cardiovascular emergency department visits, we studied outcome data compiled from 31 hospitals in relation both to routinely collected criteria pollutant data for the period January 1, 1993, to August 31, 2000, and to ARIES data for the period August 1, 1998, to August 31, 2000.

METHODS

Emergency Department Data

We asked 41 hospitals with emergency departments that serve the 20-county Atlanta metropolitan statistical area (MSA) to provide computerized billing data for all emergency department visits between January 1, 1993, and August 31, 2000. (A map showing hospital locations is available with the electronic version of this article at www.epidem.com.) Thirty-seven hospitals agreed to participate. Of these, 31 provided useable electronic data; the remaining 6 either did not maintain electronic records or the data were determined to be of poor quality. The data included the following information: medical record number, date of admission, International Classification of Diseases, 9th Revision (ICD-9) diagnosis codes, date of birth, sex; and residential zip code. Data for visits by individuals residing in any one of 222 zip codes located wholly or partially within the Atlanta MSA were included in the analyses.

Using the primary ICD-9 diagnosis code, we defined several cardiovascular disease (CVD) groups based largely on ICD-9 diagnosis codes used in published studies. The case groups were: ischemic heart disease (410–414), acute myocardial infarction (410), cardiac dysrhythmias (427), cardiac arrest (427.5), congestive heart failure (428), peripheral vascular and cerebrovascular disease (433–437, 440, 443–444, 451–453), atherosclerosis (440), and stroke (436). The combined CVD case group pooled the ICD-9 diagnoses of these case groups. We assessed the adequacy of the a priori model by evaluating emergency department visits for finger wounds (883.0), a condition unlikely to be related to air pollution. Repeat visits within a day were counted as a single visit.

Ambient Air Quality Data

For the period January 1, 1993, to August 31, 2000, we compiled air quality data for criteria pollutants from existing data sources with monitoring stations located in the Atlanta MSA, including the Aerometric Information Retrieval System (AIRS) and the Metro Atlanta Index (MAI), both operated by the Georgia Department of Natural Resources. (Monitoring stations are shown on the map available with the electronic version of this article.) We chose the pollutants and their metrics for analyses a priori based on hypotheses regarding potentially causal pollutants,[15,16] availability from the monitoring networks, and the form of the national ambient air quality standards: 24-hour average PM_{10} mass (PM with an average aerodynamic diameter less than 10 μm), 8-hour maximum ozone (O_3), 1-hour maximum nitrogen dioxide (NO_2), 1-hour maximum carbon monoxide (CO), and 1-hour maximum SO_2 (sulfur dioxide). For each criteria pollutant, data from the most central monitoring site were used in the analyses. On days when measurements were missing at the central site, data for the pollutant were imputed using an algorithm that modeled measurements from at least one secondary monitoring site in addition to meteorologic and time variables. Because ozone levels were not measured during the winter months, data for ozone were imputed only during the scheduled monitoring period (1896 days).

For the period August 1, 1998, to August 31, 2000, multiple physicochemical characteristics of PM were measured at the ARIES monitoring station. After considering the prevailing hypotheses regarding potentially causal pollutants and components,[15,16] 14 analytes were chosen a priori for analysis. The a priori metrics for all PM measurements were 24-hour averages. $PM_{2.5}$ mass (PM with an average aerodynamic diameter less than 2.5 μm) was measured using the Federal Reference Method (FRM); for days that these were missing, scaled measurements from a colocated Particle Composition Monitor were used. Coarse PM mass (PM with an average aerodynamic diameter between 2.5 and 10 μm) was measured directly. Daily PM_{10} mass was reconstructed by adding the coarse PM mass and $PM_{2.5}$ mass. Components of $PM_{2.5}$, including water-soluble metals, sulfates, acidity, organic carbon, and elemental carbon, were also assessed. The count of ultrafine particles with mobility diameter of 10 to 100 nm was measured. Twenty-four-hour concentrations of oxygenated hydrocarbons, a measure of polar volatile organic carbons, were evaluated. The gaseous criteria pollutants (O_3, NO, CO, and SO_2) were also measured continuously.

We obtained daily meteorologic data from the National Climatic Data Center at Hartsfield-Atlanta International Airport, including mean temperature and dew point temperature, estimated by averaging the minimum and maximum daily values. Data on relative humidity, wind speed, and wind direction were also obtained.

Analytic Methods

Based on a priori model specification, we constructed single-pollutant models that controlled for temporal trends in the outcome variable and meteorologic conditions. The analyses involving the criteria pollutants used data for the entire study period; the analyses involving $PM_{2.5}$, coarse PM, 10–100-nm particle count, $PM_{2.5}$ components, and oxygenated hydrocarbons included data from August 1, 1998, to August 31, 2000. All analyses were performed using SAS statistical software (SAS Institute, Inc., Cary, NC) unless otherwise indicated. The primary analyses used Poisson generalized linear modelling (GLM).[17] All risk ratios (RR) were calculated for an increase of approximately 1 standard deviation in the pollutant measure. The basic model had the following form:

$$\begin{aligned}\text{Log}[E(Y)] = \alpha + \beta\, \textit{pollutant} + \textstyle\sum_k \lambda_k\, \textit{day-of-week}_k \\ + \textstyle\sum_m \nu_m\, \textit{hospital}_m + \textstyle\sum_p \zeta_p\, \textit{holiday}_p\, g(\gamma_1, \ldots, \gamma_N; \textit{time}) \\ + g(\delta_1, \ldots, \delta_N; \textit{temperature}) + g(\eta_1, \ldots, \eta_N; \textit{dewpoint})\end{aligned}$$

Y indicated the count of emergency department visits for a given day for the outcome of interest. For each air quality variable (*pollutant*), the 3-day moving average of the 0-, 1-, and 2-day lags was used as the a priori lag structure. Models included indicator variables for day-of-week (*day-of-week*). Hospital entry and exit indicator variables (*hospital*) were used to account for the partial availability of data for some hospitals during the study period. An indicator variable for federally observed holidays (*holiday*) was also used. To control for long-term and seasonal variability, cubic splines for temporal trends ($g(\gamma_1,\ldots,\gamma_N; time)$) were included using monthly knots (τ_j) on the 21st of each month. Cubic splines were also used to control for average temperature ($g(\delta_1,\ldots,\delta_N; temperature)$) and average dew point temperature ($g(\eta_1,\ldots,\eta_N; dew\ point)$), with knots at the 25th and 75th percentiles. Cubic splines were defined such that:

$$g(\gamma_1,\gamma_2,\ldots,\gamma_N;x) = \gamma_1 x + \gamma_2 x^2 + \gamma_3 x^3 + \sum_{j=4}^{N} \gamma_j w_j(x),$$

where γ_1, γ_2, ...γ_N were parameters to be estimated, and where $w_j(x) = (x-\tau_j)^3$ if $x \geq \tau_j$, and $w_j(x) = 0$ otherwise. The first and second derivatives of $g(x)$ were continuous, allowing time trends and meteorologic variables to be modeled as smooth functions. To avoid collinearity in the cubic spline terms, we used linear transformations of the original spline terms, obtained by multiplying the design matrix of the data to be transformed by the eigenvectors of its variance–covariance matrix. Variance estimates were scaled to account for Poisson overdispersion.

Other models were run as sensitivity analyses. The frequency of knots for cubic splines was varied in GLM analyses. Alternative GLMs using natural splines with monthly knots were evaluated in S-Plus (Insightful Corp., Seattle, WA). Day-to-day serial correlation was assessed by allowing for a stationary 4-dependent correlation structure in generalized estimating equations (GEE).[18] Generalized additive models (GAM)[19] with nonparametric LOESS smoothers and nonparametric smoothing splines were also assessed in S-Plus (convergence criterion of 10^{-14}).[20] We did not use standard errors for GAMs because the standard software underestimates the variance of the parameter estimates.[21,22] Methods to obtain correct variance estimates are still in development.[23,24]

Several exploratory analyses were conducted after a priori modeling. Secondary models explored alternative pollutant lag structures, including lag 0 (same-day pollution levels) to lag 7 (pollution levels 1 week prior). Season-specific analyses for warm (April 15–October 14) and cool (October 15–April 14) seasons were conducted. Age-specific analyses for CVD visits were also explored by subsetting visits for adults (age 19 years and older) and the elderly (age 65 years and older). Multipollutant models were evaluated.

RESULTS

Thirty-one hospitals provided data on 4,407,535 emergency department visits by Atlanta residents for the study period. These 31 hospitals were estimated to receive 79% of emergency department visits in the Atlanta MSA. Five hospitals provided data for the entire 7-year time period of the study; the remaining 26 hospitals provided data for part of the period. The number of total emergency department visits in the study database increased from a mean of 413 (standard deviation = 50) per day in 1993 to 2675 (201) in 2000.

There was an average of 37 CVD visits per day (an average of 55 CVD visits per day for the 25-month ARIES time period); CVD subgroups had between 0.2 visits per day (atherosclerosis) and 11.7 visits per day (ischemic heart disease) (Table 1). Because the mean number of daily visits for cardiac arrest, acute myocardial infarction, atherosclerosis, and stroke were low (<5) and models using these outcomes were therefore unstable, we do not present the results for these CVD subgroups. The proportion of CVD visits contributed by each subgroup was stable over the study period. There was a seasonal pattern in CVD visits, with the highest number of daily visits occurring in the winter months and lowest in the summer months. The number of CVD visits was highest on Monday and lowest on Saturday.

Tables 2 and 3 provide descriptive statistics for the daily concentrations of the air quality analytes and correlations among analytes. Correlations between $PM_{2.5}$ mass and its components were generally high ($r > 0.5$), as were correlations between different PM mass size fractions. Measurements of 10 to 100 nm particle count were generally uncorrelated with other pollutant measures. Strong correlations were noted between daily measures of $PM_{2.5}$ and O_3 ($r = 0.65$) and NO_2 and CO ($r = 0.68$). Measurements of O_3, PM_{10}, and $PM_{2.5}$ peaked in warmer months. $PM_{2.5}$ components such as water-soluble metals, sulfate, and acidity varied temporally with $PM_{2.5}$ mass, whereas organic carbon and elemental carbon peaked in colder months. SO_2 exhibited a bimodal pattern with peaks in both summer and winter. Concentrations of CO tended to peak during winter. The highest concentrations for NO_2 occurred in spring. Compared with other U.S. cities, O_3 and $PM_{2.5}$ are relatively high (with sulfate and organic carbon comprising relatively high proportions of the fine particle mass) and acidity is relatively low.[25]

In a priori single-pollutant models using 3-day moving averages, CVD visits were associated with NO_2, CO, $PM_{2.5}$, organic carbon, elemental carbon, and oxygenated hydrocarbons (Table 4). Of the cardiovascular subgroups, congestive heart failure was positively associated with $PM_{2.5}$, organic carbon, and elemental carbon. Ischemic heart disease was positively associated with NO_2 and oxygenated hydrocarbons. Peripheral vascular and cerebrovascular disease was positively associated with NO_2, CO, and $PM_{2.5}$. No positive

TABLE 1. Mean of Daily Counts of Emergency Department Visits at 31 Participating Hospitals for the Period January 1, 1993–August 31, 2000, Study of Particles and Health in Atlanta (SOPHIA)*

	ICD-9 Codes	Mean
Total emergency department visits per day		1574
All cardiovascular disease	410–414, 427–428, 433–437, 440, 443–444, 451–453	37.0
Dysrhythmia	427	9.8
Cardiac arrest	427.5	3.0
Congestive heart failure	428	7.2
Ischemic heart disease	410–414	11.7
Acute myocardial infarction	410	4.5
Peripheral vascular and cerebrovascular disease	433–437, 440, 443–444, 451–453	8.4
Atherosclerosis	440	0.2
Stroke	436	1.3
Finger wounds	883.0	21.4

*Standard deviation and selected percentiles available with the electronic version of this article.
ICD-9, International Classification of Diseases, 9th Revision; SD, standard deviation.

TABLE 2. Median and 10% to 90% Range of Daily Ambient Air Quality Measurements for Criteria Pollutants from AIRS/MAI During the Period January 1, 1993–August 31, 2000, and for Other Pollutants From ARIES During the Period August 1, 1998–August 31, 2000*

	Beginning Year	No. of Days	Median	(10% to 90% range)
24-h PM_{10} ($\mu g/m^3$)†	1993	2703	26.3	(13.2 to 44.7)
8-h ozone (ppb)†‡	1993	1892	53.9	(26.8 to 87.6)
1-h NO_2 (ppb)†	1993	2775	44.0	(25.0 to 68.0)
1-h CO (ppm)†	1993	2758	1.5	(0.5 to 3.4)
1-h SO_2 (ppb)†	1993	2775	11.0	(2.0 to 39.0)
24-h $PM_{2.5}$ ($\mu g/m^3$)	1998	750	17.8	(8.9 to 32.3)
24-h coarse PM ($\mu g/m^3$)	1998	679	9.1	(4.4 to 16.2)
24-h 10–100 nm particle count (no/cm^3)	1998	427	25,900	(11,500 to 74,600)
24-h $PM_{2.5}$ water-soluble metals ($\mu g/m^3$)	1998	692	0.021	(0.006 to 0.061)
24-h $PM_{2.5}$ sulfates ($\mu g/m^3$)	1998	687	4.5	(1.9 to 10.7)
24-h $PM_{2.5}$ acidity (μ-equ/m^3)§	1998	646	0.010	(−0.001 to 0.045)
24-h $PM_{2.5}$ organic carbon ($\mu g/m^3$)	1998	715	4.1	(2.2 to 7.1)
24-h $PM_{2.5}$ elemental carbon ($\mu g/m^3$)	1998	714	1.6	(0.8 to 3.7)
24-h oxygenated hydrocarbon (ppb)	1998	594	29.1	(15.0 to 53.1)
Average temperature (°C)¶	1993	2800	18.3	(6.1 to 27.2)
Average dew point (°C)¶	1993	2800	12.0	(−2.2 to 20.8)

*Mean, standard deviation, selected additional percentiles, and number of nonmissing days available with the electronic version of this article. www.epidem.com

†Data were imputed for 17% (458 of 2703) of PM_{10} values, 2% (46 of 1892) of O_3 values, 14% (398 of 2775) of NO_2 values, 6% (161 of 2758) of CO values, and 9% (237 of 2775) of SO_2 values.

‡Ozone was measured for 1896 days: 3/1/1993–11/30/1993, 3/1/1994–11/30/1994, 3/1/1995–11/30/1995, 3/1/1996–10/31/1996, 4/1/1997–10/31/1997, 4/1/1998–10/31/1998, 4/1/1999–10/31/1999, 3/1/2000–8/31/2000.

§Acidity is reported in units of μ-equ/m^3, a measure of pH level. If converted into units of nmol/m^3, the median is 10.

¶For temperature and dew point: average of minimum and maximum values recorded at Hartsfield-Atlanta International Airport.

AIRS, Aerometric Information Retrieval System; ARIES, Aerosol Research and Inhalation Epidemiology Study; CO, carbon monoxide; MAI, Metro Atlanta Index; NO_2, nitrogen dioxide; PM, particulate matter; SO_2, sulfur dioxide.

TABLE 3. Spearman Correlation Coefficients for Daily Ambient Air Quality Measurements

	24-h PM_{10}	8-h O_3	1-h NO_2	1-h CO	1-h SO_2	24-h $PM_{2.5}$	24-h Coarse PM	24-h Ultrafine (10–100 nm) Count	24-h $PM_{2.5}$ Water-Soluble Metals	24-h $PM_{2.5}$ Sulfates	24-h $PM_{2.5}$ Acidity	24-h $PM_{2.5}$ OC	24-h $PM_{2.5}$ EC	24-h OHC	Average Temperature
24-h PM_{10}	1														
8-h O_3	0.59	1													
1-h NO_2	0.49	0.42	1												
1-h CO	0.47	0.20	0.68	1											
1-h SO_2	0.20	0.19	0.34	0.26	1										
24-h $PM_{2.5}$	0.84	0.65	0.46	0.44	0.17	1									
24-h coarse PM	0.59	0.35	0.46	0.32	0.21	0.43	1								
24-h ultrafine (10–100 nm) PM	−0.13	−0.13	0.26	0.10	0.24	−0.16	0.13	1							
24-h $PM_{2.5}$ water-soluble metals	0.74	0.48	0.32	0.28	0.00	0.70	0.47	−0.27	1						
24-h $PM_{2.5}$ sulfates	0.74	0.63	0.17	0.13	0.08	0.77	0.26	−0.31	0.71	1					
24-h $PM_{2.5}$ acidity	0.68	0.64	0.10	−0.01	−0.03	0.58	0.23	−0.39	0.62	0.82	1				
24-h $PM_{2.5}$ organic carbon	0.69	0.50	0.63	0.55	0.16	0.73	0.51	0.08	0.46	0.39	0.30	1			
24-h $PM_{2.5}$ elemental carbon	0.56	0.37	0.61	0.63	0.20	0.61	0.48	0.08	0.49	0.29	0.14	0.82	1		
24-h oxygenated hydrocarbon	0.42	0.42	0.30	0.31	0.14	0.40	0.31	0.05	0.33	0.32	0.32	0.46	0.41	1	
Average temperature	0.58	0.58	0.08	0.09	−0.06	0.39	0.20	−0.33	0.56	0.64	0.84	0.15	0.06	0.34	1
Average dew point	0.44	0.26	−0.13	−0.01	−0.15	0.29	0.00	−0.41	0.48	0.57	0.77	−0.01	−0.04	0.25	0.02

associations were observed for any pollutant measure and dysrhythmia. No associations were observed for finger wounds.

The observed associations from the a priori model were robust to model structure and specification. In sensitivity analyses of GLMs using alternative frequencies of knots in cubic splines for control of long-term temporal trends, similar results were observed (table available with the electronic version of this article). Residual serial correlation, assessed by GEE with a stationary 4-dependent correlation structure, was minimal. No negative autocorrelation of the residuals was observed for the a priori model. Point estimates obtained from analyses using GAMs were similar to those from GLMs.

We conducted secondary analyses of GLMs with single-day pollutant lags up to 7 days before the CVD visit. Figure 1 presents results for CVD visits with each air-quality analyte lagged zero to 7 days. For the 6 pollutants with significantly positive associations using the 3-day moving average ($PM_{2.5}$, NO_2, CO, organic carbon, elemental carbon, and oxygenated hydrocarbons), the associations for pollution levels on the same day as CVD visits tended to be the strongest. Results for the CVD subgroups showed similar patterns, with the strongest associations observed for pollutant concentrations on the same day or days immediately before the emergency department visit.

In age-specific analyses, associations for CVD visits by both adults and the elderly were similar in magnitude to those obtained in analyses, including all ages. Season-specific analyses indicated some seasonal variation in the associations between certain pollutants and CVD visits. Associations tended to be highest during colder months and lowest during warmer months.

Table 5 shows a comparison of results from models for the period August 1, 1998, to August 31, 2000, using data on criteria pollutants from the ARIES and AIRS/MAI monitors. The magnitude of effect estimates from the 2 sources of air quality data was similar.

Multipollutant models were evaluated for CVD visits with the pollutants that were statistically significant in a priori models (Fig. 2). Because organic carbon and elemental carbon were highly correlated ($r = 0.82$), a measure of total carbon was defined by summing them for use in multipollutant models (in single-pollutant models with CVD, per 3 $\mu g/m^3$: RR = 1.026; 95% confidence interval = 1.007–1.045). In a 2-pollutant model for the entire study period (January 1, 1993–August 31, 2000), the estimate for NO_2 was attenuated slightly, whereas the estimate for CO was indis-

TABLE 4. Results of a priori Models* for the Association of Emergency Department Visits for Cardiovascular Disease, Cardiovascular Subgroups, and Finger Wounds With Daily Ambient Air Quality Measurements

Pollutant[†]	Unit[‡]	All CVD RR (95% CI)	Dysrhythmia RR (95% CI)	CHF RR (95% CI)	IHD RR (95% CI)	PERI RR (95% CI)	Finger Wounds[§] RR (95% CI)
January 1, 1993–August 31 2000							
24-h PM_{10}	10 μg/m³	1.009 (0.998–1.019)	1.008 (0.988–1.029)	0.992 (0.968–1.016)	1.011 (0.992–1.030)	1.020 (0.999–1.043)	1.008 (0.995–1.022)
8-h O_3	25 ppb	1.008 (0.987–1.030)	1.008 (0.967–1.051)	0.965 (0.918–1.014)	1.019 (0.981–1.059)	1.026 (0.985–1.070)	1.014 (0.987–1.042)
1-h NO_2	20 ppb	1.025 (1.012–1.039)	1.019 (0.994–1.044)	1.010 (0.981–1.040)	1.025 (1.005–1.053)	1.041 (1.013–1.059)	1.010 (0.993–1.027)
1-h CO	1 ppm	1.017 (1.008–1.027)	1.012 (0.993–1.031)	1.010 (0.988–1.032)	1.016 (0.999–1.034)	1.031 (1.010–1.052)	1.008 (0.995–1.021)
1-h SO_2	20 ppb	1.007 (0.993–1.021)	1.003 (0.975–1.028)	0.992 (0.961–1.025)	1.007 (0.981–1.033)	1.026 (0.999–1.059)	1.007 (0.988–1.026)
August 1, 1998–August 31, 2000							
24-h $PM_{2.5}$	10 μg/m³	1.033 (1.010–1.056)	1.015 (0.976–1.055)	1.055 (1.006–1.105)	1.023 (0.983–1.064)	1.050 (1.008–1.093)	0.995 (0.968–1.023)
24-h coarse PM	5 μg/m³	1.012 (0.985–1.040)	1.021 (0.974–1.070)	1.020 (0.966–1.077)	0.994 (0.946–1.043)	1.022 (0.972–1.074)	1.000 (0.967–1.035)
24-h 10–100 nm particle count	30,000 no/cm³	0.985 (0.965–1.005)	0.972 (0.937–1.008)	0.983 (0.943–1.025)	0.989 (0.953–1.026)	0.998 (0.960–1.038)	0.999 (0.974–1.024)
24-h $PM_{2.5}$ water-soluble metals	0.03 μg/m³	1.027 (0.998–1.056)	1.031 (0.982–1.082)	1.040 (0.981–1.103)	1.008 (0.973–1.051)	1.043 (0.991–1.098)	1.001 (0.968–1.036)
24-h $PM_{2.5}$ sulfates	5 μg/m³	1.003 (0.958–1.049)	0.986 (0.926–1.048)	1.009 (0.938–1.085)	0.997 (0.936–1.062)	1.025 (0.964–1.090)	0.983 (0.942–1.025)
24-h $PM_{2.5}$ acidity	0.02 μeq/m³	0.994 (0.966–1.022)	0.991 (0.942–1.043)	0.989 (0.930–1.052)	0.992 (0.944–1.043)	1.004 (0.955–1.056)	0.969 (0.935–1.004)
24-h $PM_{2.5}$ organic carbon	2 μg/m³	1.026 (1.006–1.046)	1.008 (0.975–1.044)	1.048 (1.007–1.091)	1.028 (0.994–1.064)	1.026 (0.990–1.062)	0.990 (0.966–1.014)
24-h $PM_{2.5}$ elemental carbon	1 μg/m³	1.020 (1.005–1.036)	1.011 (0.985–1.037)	1.035 (1.003–1.069)	1.019 (0.992–1.046)	1.021 (0.994–1.049)	1.003 (0.984–1.021)
24-h oxygenated hydrocarbons	15 ppb	1.029 (1.000–1.059)	1.007 (0.958–1.059)	1.034 (0.972–1.099)	1.066 (1.013–1.122)	1.008 (0.954–1.055)	1.011 (0.973–1.050)

*Single-pollutant GLM models including indicators for day-of-week, hospital entry, and holidays, cubic splines for time with monthly knots; cubic splines for temperature and dewpoint temperature with knots at the 25th and 75th percentile

[†]3-day moving average;

[‡]Approximately 1 standard deviation;

[§]Emergency department visits for finger wounds were used to assess the adequacy of the a priori model.

CVD, cardiovascular disease; CHF, congestive heart failure; IHD, ischemic heart disease; PERI, peripheral vascular and cerebrovascular disease;

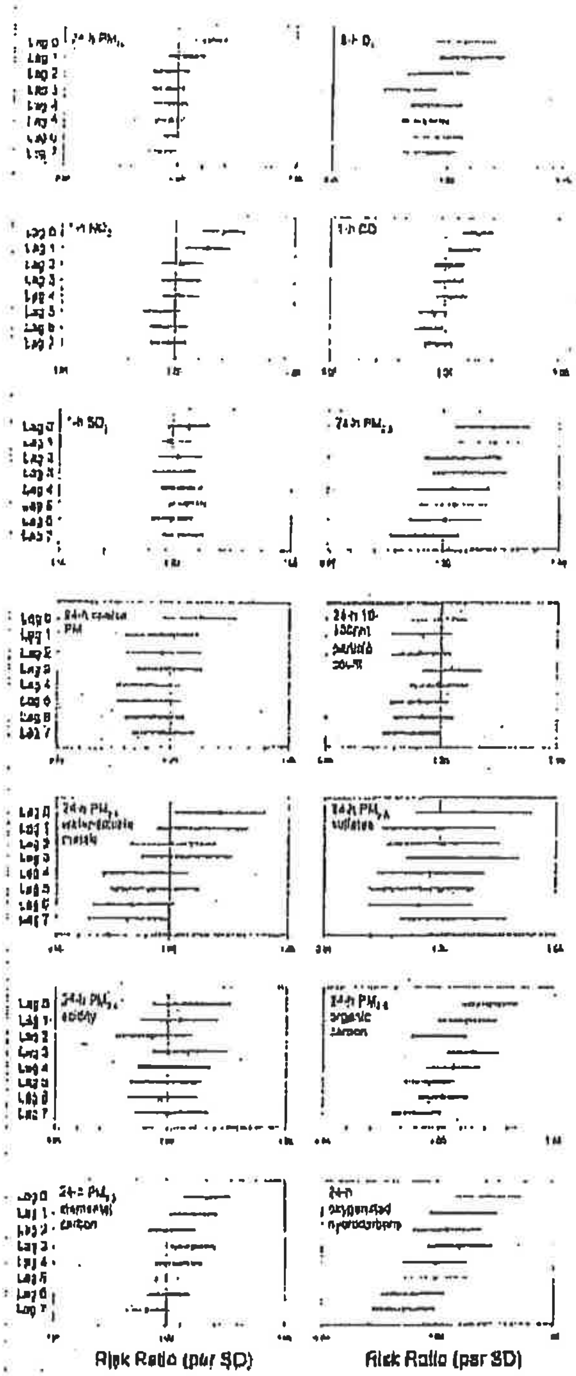

FIGURE 1. Risk ratios (diamonds) and 95% confidence intervals (horizontal lines) of single-day lag models for the association of emergency department visits for cardiovascular disease with daily ambient air quality measurements.

tinguishable from the null. In contrast, in the 2-pollutant models for the time period August 1, 1998, to August 31, 2000, the magnitude of the estimates for CO were similar to the magnitude observed in the single-pollutant model in models with $PM_{2.5}$, with NO_2, and with oxygenated hydrocarbons. The estimates for $PM_{2.5}$, NO_2, total carbon, and oxygenated hydrocarbons were generally attenuated and indistinguishable from the null in 2-pollutant models. These patterns persisted in 3-, 4-, and 5-pollutant models. All multipollutant models had a reduced number of days available for the analysis, because only days with nonmissing data for all pollutants in the model were included.

DISCUSSION

This time-series study of emergency department visits provided a unique opportunity to examine the relationship between cardiovascular conditions and ambient gaseous and particulate pollution levels, including the physicochemical components of PM. In a priori models, CVD visits were associated with several particle measures ($PM_{2.5}$ mass, organic carbon, and elemental carbon) and gas measures (CO, NO_2, and oxygenated hydrocarbons). Visits for peripheral vascular and cerebrovascular disease were associated with $PM_{2.5}$ and the gases NO_2 and CO. Congestive heart failure visits were associated with $PM_{2.5}$ and two $PM_{2.5}$ components, organic carbon, and elemental carbon. The gaseous pollutants NO_2 and oxygenated hydrocarbons were associated with ischemic heart disease. In multipollutant models, the estimates for NO_2 remained elevated during the 7-year period, whereas CO estimates were elevated during the 25-month period; these 2 pollutants are strongly correlated ($r = 0.68$).

Although other time-series studies have used different cardiovascular morbidity measures such as hospital admissions, our results are consistent with previously reported associations for all cardiovascular conditions combined, as well as ischemic heart disease and congestive heart failure, with PM,[4,7-10,12,13] NO_2,[2,3,5,7,8,10,12,26,27] and CO.[3,4,7,9,11,12,26,28,29] Because two-thirds of emergency department visits for cardiovascular conditions result in hospital admission,[30] those 2 measures of cardiovascular morbidity comprise overlapping populations. Emergency department visits also include some cardiovascular conditions that, although not severe enough to lead to hospitalization, nonetheless require medical attention. The observed associations for CVD visits in the present study contribute to the coherence of evidence supporting the relation between cardiovascular morbidity and ambient air pollution levels.

The biologic mechanisms underlying the relation between ambient air pollution and cardiovascular conditions are unknown, but could involve modulation of the autonomic nervous system or induction of circulating inflammatory parameters. Several small studies indicated that ambient $PM_{2.5}$ levels were associated with decreased heart rate variability, reflecting changes in autonomic nervous activity.[31-34]

TABLE 5. Comparison of Results of a priori Models* for the Association of Emergency Department Visits for Cardiovascular Disease With Daily Ambient Air Quality Levels Measurements

		AIRS/MAI Data January 1, 1993–August 31, 2000	AIRS/MAI Data August 1, 1998–August 31, 2000	ARIES Data August 1, 1998–August 31, 2000
Pollutant[†]	Unit[‡]	RR (95% CI)	RR (95% CI)	RR (95% CI)
24-h PM_{10}[§]	10 μg/m³	1.009 (0.998–1.019)	1.027 (1.009–1.046)	1.017 (0.997–1.037)
8-h O_3[§]	25 ppb	1.008 (0.987–1.030)	0.994 (0.957–1.032)	0.994 (0.954–1.035)
1-h NO_2[§]	20 ppb	1.025 (1.012–1.039)	1.025 (1.004–1.045)	1.037 (1.005–1.070)
1-h CO[§]	1 ppm	1.017 (1.008–1.027)	1.029 (1.012–1.046)	1.044 (1.022–1.067)
1-h SO_2[§]	20 ppb	1.007 (0.993–1.022)	1.019 (0.996–1.043)	1.016 (0.989–1.044)

*Single-pollutant GLM models including indicators for day-of-week, hospital entry and holidays; cubic splines for time with monthly knots; cubic splines for temperature and dewpoint temperature with knots at the 25th and 75th percentile

†3-day moving average.

‡Approximately 1 standard deviation

§Spearman correlation coefficients for data on the same pollutant from AIRS and ARIES monitors for PM_{10}, $r = 0.88$; O_3, $r = 0.98$; NO_2, $r = 0.78$; CO, $r = 0.70$; and SO_2, $r = 0.81$.

Several cardiac conditions, including sudden cardiac death and myocardial infarction, are associated with altered autonomic function.[35] Ambient PM_{10} has also been associated with increased levels of circulating fibrinogen and markers of inflammation.[36,37] Fibrinogen and acute-phase proinflammatory proteins can increase blood coagulability, leading to ischemia and exacerbating cardiovascular disease.[38]

Major challenges in interpreting studies such as the present one include the likelihood of confounding by correlated pollutants and the possibility that a given pollutant is acting as a surrogate for other unmeasured or poorly measured pollutants. Multipollutant models are often used to address confounding by correlated pollutants, but these results can be as misleading as single-pollutant models. In a situation in which a poorly measured pollutant that is truly associated with the outcome is correlated with another pollutant that is better measured but biologically irrelevant, the latter pollutant could be a predictor both in a single pollutant and a multipollutant model.[39] Moreover, if the pollutants act as surrogates for unmeasured agents that are truly responsible for the association,[40] the strongest predictor in a multipollutant model could simply indicate which measured pollutant is the best surrogate for the unmeasured pollutant of interest. For example, suppose that traffic particles are qualitatively different from other particles and that these are the agents largely responsible for a particular health outcome. We had no direct measurement of traffic particles, and it is possible that a number of the pollutant measurements associated with CVD visits are surrogates for such an agent.

Because the goal of this study was to assess the impact of ambient pollution levels on the cardiovascular health of the population, the error that results from the use of ambient air quality measurements from centrally located monitors must be considered. The measurement error in data from a central monitor, rather than a weighted average of individual ambient exposures, includes instrument error, error from local sources, and error resulting from regional spatial heterogeneity, all of which would likely lead to attenuation of the effect estimates. These types of measurement error in the exposure could have led to the lack of association observed with some pollutants, but are unlikely to have led to spurious results. Additionally, the present study assessed the relationship between ambient air pollution and cardiovascular conditions in this population, given personal behaviors that could modify exposure levels. In Atlanta, approximately 83% of homes are equipped with central air conditioning,[41] the use of which can reduce personal air pollution exposure during the warm season. Thus, the effect for a given increment in the ambient level of a pollutant in Atlanta during warmer months could be smaller than in some other cities without widespread air conditioning use.[42]

Ultrafine PM data presented problems beyond measurement error. Although the instruments used to measure ultrafine PM were state-of-the-art, they had not been used extensively in the field. Because of instrument malfunctions, the ultrafine PM measurements were frequently missing during the study period, often for long periods of time. The large missing data problem could have led to unreliable effect estimates. Additional discussion of the ultrafine measurements can be found elsewhere.[43,44]

Many of the air quality concentrations measured at the ARIES monitoring site appeared to be spatially representative of the Atlanta MSA. Measurements of criteria pollutants were available from both the ARIES and AIRS/MAI monitoring sites; concentrations measured at the 2 types of sites were highly correlated and not substantially or systematically different. For spatially variable pollutants that vary by distance from mobile sources, such as NO_2 and CO, the measurements

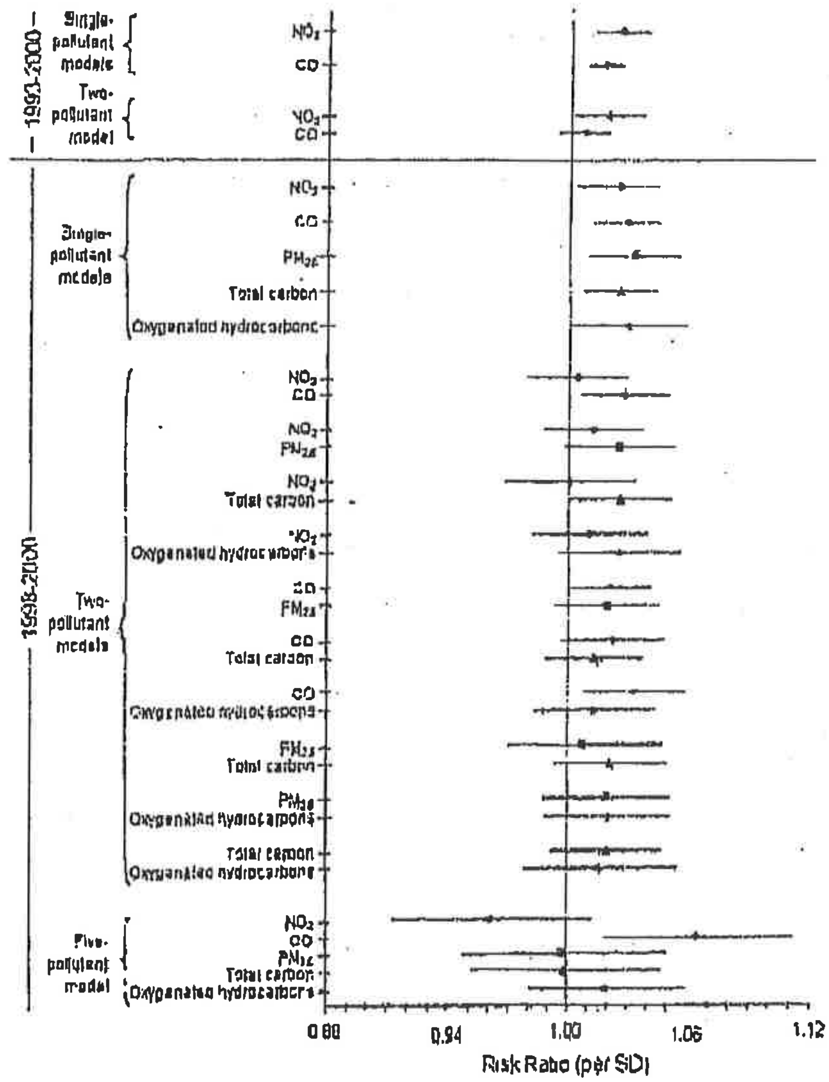

FIGURE 2. Risk ratios (symbols) and 95% confidence intervals (horizontal lines) of multipollutant models for the association of emergency department visits for cardiovascular disease with daily ambient air quality measurements.

from the ARIES site appear to reflect what is being measured at the AIRS sites. Epidemiologic analyses using ARIES data for criteria pollutants yielded similar results to a priori analyses using AIRS/MAI data. The spatial distribution of ambient $PM_{2.5}$ and several of its constituents, including sulfates, organic carbon, and elemental carbon, appear to be relatively homogenous; measurements from the ARIES monitoring site were similar to those from other monitoring sites in Atlanta.[25] No information was available to assess the spatial variability for 10- to 100-nm particle count or oxygenated hydrocarbons.

To reduce the problems associated with multiple testing and model selection strategies, we used a priori models for our primary analyses, specifying analytes of interest, pollutant lag, and the structure of the model.[45,46] An a priori list of 14 air quality measures was distilled from the large number of pollutant metrics available after taking into account the current hypotheses on potentially causal pollutants and components.[15,16] The choice of a priori pollutant lag structure was based on previously reported associations in time-series studies of cardiovascular morbidity and influenced by biologically plausible hypotheses. The a priori model was constructed by using information obtained from previously published health effects studies regarding methods of controlling for temporal trends and other confounding factors. Although the periodic frequency of long-term trends in the data might not have necessitated the use of monthly knots, potentially overcontrolling for confounding by time was considered a better alternative to undercontrolling. In comparing the a priori models to GLMs using alternative frequencies of knots, the magnitude of the estimates for CVD visits were similar. Although the satisfaction of statistical criteria (eg, Akaike's Information Criteria, Bartlett test) does not imply successful control of confounding, the application of such criteria yielded results similar to those obtained using the a priori model. Further evidence of the robustness of the a priori model was provided by the similarity of results from analyses using GAMs. Additionally, no associations were observed with finger wounds, providing no indication that the a priori model structure systematically induced spurious results. Simulation studies have demonstrated that selecting an a priori model avoids bias introduced when choosing and reporting results from the best model and lag structure based on the strongest effect estimate.[47,48] Although some of the associations observed are likely to be random, the number and consistency of positive associations seen for CVD and cardiovascular subgroup visits and various pollutant measures is notable.

The study took advantage of a unique source of air quality data in Atlanta to examine the relation between ambient air pollutants, including physicochemical components of PM, and cardiovascular emergency department visits. CVD visits were positively associated with ambient concentrations of CO, NO_2, $PM_{2.5}$, organic carbon, elemental carbon, and oxygenated hydrocarbons. CVD subgroups such as congestive heart failure, ischemic heart disease, and peripheral and cerebrovascular disease were also associated with several pollutant measures. The relationships observed in this study could represent an association with one or more correlated copollutants such as other characteristics of traffic-related pollution. The effect of ambient pollution on cardiovascular conditions appeared to be rapid, because the strongest associations tended to be observed with pollution levels on the same day as the emergency department visits.

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Ambient Air Pollution and Respiratory Emergency Department Visits

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Abstract TOP

Background. A number of emergency department studies have corroborated findings from mortality and hospital admission studies regarding an association of ambient air pollution and respiratory outcomes. More refined assessment has been limited by study size and available air quality data.

Methods. Measurements of 5 pollutants (particulate matter [PM_{10}], ozone, nitrogen dioxide [NO_2], carbon monoxide [CO], and sulfur dioxide [SO_2]) were available for the entire study period (1 January 1993 to 31 August 2000); detailed measurements of particulate matter were available for 25 months. We obtained data on 4 million emergency department visits from 31 hospitals in Atlanta. Visits for asthma, chronic obstructive pulmonary disease, upper respiratory infection, and pneumonia were assessed in relation to air pollutants using Poisson generalized estimating equations.

Results: In single-pollutant models examining 3-day moving averages of pollutants (lags 0, 1, and 2): standard deviation increases of ozone, NO_2, CO, and PM_{10} were associated with 1-3% increases in URI visits; a 2 $\mu g/m^3$ increase of $PM_{2.5}$ organic carbon was associated with a 3% increase in pneumonia visits; and standard deviation increases of NO_2 and CO were associated with 2-3% increases in chronic obstructive pulmonary disease visits. Positive associations

persisted beyond 3 days for several of the outcomes, and over a week for asthma.

Conclusions: The results of this study contribute to the evidence of an association of several correlated gaseous and particulate pollutants, including ozone, NO_2, CO, PM, and organic carbon, with specific respiratory conditions.

A number of studies of emergency department visits, a relatively sensitive outcome for respiratory conditions, have corroborated findings from mortality and hospital admission studies regarding an association of ambient air pollution levels and respiratory health effects.[1-4] More refined assessment, including analysis of subgroups defined by specific illness or ages, or of air pollutants not routinely monitored, has been limited by study size and available air quality and health outcome data. Many of the single-city time-series studies have covered a relatively short time-span or involved a moderately low number of daily outcome events, resulting in imprecise effect estimates and often restricting analyses to broad outcome and age groups. Recent multicity time-series studies, although having a relatively large number of daily outcome counts, were limited to routinely available outcome and air-quality datasets.[5-7]

The present study is part of the Study of Particles and Health in Atlanta (SOPHIA). This collection of studies uses extensive air quality data, including detailed particulate matter (PM) component and size fraction information, from a monitoring station in Atlanta operated by the Aerosol Research and Inhalation Epidemiology Study (ARIES). Emergency department visits for respiratory illness were analyzed in relation to routinely collected criteria pollutant levels for the period 1 January 1993 through 31 August 2000, and in relation to additional air pollutants measured at the ARIES monitoring station for the period 1 August 1998 through 31 August 2000. The results for the cardiovascular visits are presented elsewhere.[8] In this work, we took advantage of the large number of respiratory emergency department visits and extensive air quality data to examine multiple pollutants in relation to specific respiratory outcomes.

METHODS TOP

Ambient Air Quality Data TOP

We selected the pollutants and metrics for this analysis a priori on the basis of current hypotheses regarding potentially causal pollutants and components.[9,10] We also included pollutants in the a priori list that may be useful markers for sources or for groups of related pollutants (eg, carbon monoxide as a potential marker for primary traffic-related pollutants).

For the period 1 January 1993 through 31 August 2000, we obtained ambient air quality data for 24-hour average PM_{10} mass (PM with an average aerodynamic diameter less than 10 micrometers), 8-hour maximum ozone, and 1-hour maximum nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and carbon monoxide (CO) from several existing monitoring networks, including the Air Quality System (AQS, formerly the Aerometric Information Retrieval System or AIRS), the Georgia Department of Natural Resources, and Metro Atlanta Index. (See map, with the electronic version of this article.) Ozone levels were not monitored during the winter months when ozone levels in Atlanta are low; the remaining pollutants were measured year-round. The AQS air quality data have been described elsewhere.[8]

For the final 25 months of the study period (1 August 1998 through 31 August 2000), an extensive suite of pollutants, including PM size fractions and components, was measured at the ARIES monitoring station. We selected the following pollutants and metrics for this analysis a priori: oxygenated hydrocarbons (OHC), $PM_{2.5}$ mass (PM with an average aerodynamic diameter less than 2.5 micrometers), coarse PM (PM with an average aerodynamic diameter between 2.5 and 10 micrometers), ultrafine PM count (PM with an average aerodynamic diameter between 10 and 100 nanometers [nm]), and the $PM_{2.5}$ components sulfate, acidity, elemental carbon (EC), organic carbon (OC), and an index of water-soluble transition metals. The metrics for PM size fractions and components and for OHC were 24-hour averages, 8-hour maximum for ozone, and 1-hour maximum for NO_2, SO_2, and CO. The measurement methods for the ARIES monitoring station have previously been described.[8,11]

Average temperature and dew point temperature (average of the daily minimum and maximum), as well as additional meteorological data measured at Hartsfield-Atlanta International Airport, were obtained from the National Climatic Data Center network. Speciated pollen counts were obtained from the Atlanta Allergy Clinic.

Emergency Department Data TOP

Of the 41 hospitals in the 20-county Atlanta metropolitan statistical area, 37 agreed to participate and 31 provided usable computerized billing records for at least part of the study period. (The map available with the electronic version of this article shows hospital locations.)

Computerized billing records for all emergency department visits between 1 January 1993 and 31 August 2000 were collected, including primary International Classification of Diseases 9th Revision (ICD-9) diagnostic code, secondary ICD-9 diagnosis codes, age, date of birth, sex, race, and residential zip code. Residents of the Atlanta metropolitan statistical area, determined by residential zip code at the time of the visit, were included in the analyses. Repeat visits within a single day were counted as a single visit.

Respiratory case groups of interest were defined using the primary ICD-9 diagnostic codes (all 2-digit extensions were used unless otherwise specified): asthma (493, 786.09), COPD (491, 492, 496), URI (460-466, 477), pneumonia (480-486), and an all-respiratory-disease group that combines the above 4 groups. We assessed the adequacy of the modeling approach using visits for finger wounds (883.0), an outcome group that has comparable temporal variations to the respiratory outcomes of interest and is expected to be unrelated to air pollution.

Analytic Methods TOP

All analyses were performed using SAS statistical software, version 8.2 (SAS Institute, Inc., Cary, NC) unless otherwise indicated. We defined a priori single-pollutant models to control for long-term temporal trends and meteorological conditions. For the a priori analyses we used Poisson generalized estimating equations,12 with a stationary 4-dependent correlation structure to account for possible autocorrelation in the outcome data (URI, asthma, all respiratory disease) and Poisson generalized linear models13 for outcomes with minimal autocorrelation (pneumonia, COPD). Risk ratios and 95% confidence intervals were calculated for an increase of approximately a standard deviation of pollutant levels. The basic model had the following form:

Equation (Uncited)

where Y indicated the count of emergency department visits for a given day for the outcome of interest. The a priori models contained a 3-day moving average of pollution levels lagged 0, 1, and 2 days relative to the visits (levels on the same day as the visit, 1 day previous, and 2 days previous, respectively) (*pollutant*). Long-term temporal trends were accounted for using cubic splines with monthly knots [$g(\gamma_1, \ldots, \gamma_N; time)$]. Because ozone data were not available from November through March, ozone models used separate time splines for each year. Additional season indicator variables (the 21st day of March, June, September, and December) were added to further control for seasonal trends (*season*). Cubic splines also were used to control for daily average temperature [$g(\delta_1, \ldots, \delta_N, temp)$] and dew point [$g(\eta_1, \ldots, \eta_N; dew\ point)$] with knots at the 25th and 75th percentiles (moving average of lags 0, 1, and 2). Indicator variables for day of week (*DOW*), federal holidays (*holiday*), and hospital entry and exit (*hospital*) also were included in the a priori model (as the hospitals provided data for varying amounts of time). The cubic splines *g(x)*, were defined as follows:

Equation (Uncited)

where $w_j(x) = (x - \tau_j)^3$ if $x \geq \tau_j$, and $w_j(x) = 0$ otherwise. The cubic splines were defined so that the first and second derivatives were continuous. We evaluated multipollutant models using the same covariates as the single-pollutant models.

We performed several secondary analyses. To assess the lag structure between pollutant levels and emergency department visits, we initially examined separate models for each lag from 0 to 7 days before the visit (up to 2 weeks prior to the visit for asthma). To estimate the overall effect of a unit increase in pollution during the previous 2 weeks, and to investigate whether associations persisted longer than 3 days, we ran unconstrained distributed lag models, including pollution levels from 0 to 13 days before the visit, with additional cubic terms for lags 3-13 for temperature and dew point (in addition to the cubic splines for lags 0-2). For the distributed lag models we presented results only for the pollutants available for the entire study period as the models became unstable for the pollutants available only 25 months.

We examined age-specific case groups (ages 0-1 year, 2-18, 19 years and older, and 65 years and older) as well as season-specific models for warm (April 15 to October 14) and cool (October 15 to April 14) periods. Daily pollen counts (grass, oak, and ragweed) and daily counts of influenza emergency department visits were assessed as confounders. We also assessed general additive models using S-Plus 2000 software (Insightful Corporation Seattle, WA) with nonparametric LOESS smoothers and nonparametric smoothing splines (10^{-14} convergence criteria).14,15

In addition to examining the alternate outcome group believed unrelated to air pollution (finger wounds), we performed other analyses to evaluate the adequacy of the modeling approach. We explored negative lags for pollution (pollution levels on days after the visit) as exposure variables, controlling for positive lags, to evaluate the possibility that the modeling choices induced positive associations. We altered the placement (day of the month) and number of knots (degrees of freedom) in the cubic splines for time.

RESULTS TOP

Descriptive statistics for the air quality variables are presented in Table 1; Spearman rank correlation statistics between the daily measures were previously published.8 (Appendix Table 1, available with the electronic version of this article, presents the correlation statistics.) The extent of correlation among the pollutants followed expected patterns. Ultrafine PM count levels were negatively correlated with several pollutants, including ozone, PM; and PM components (sulfate, acidity, and metals). CO, NO_2, $PM_{2.5}$ organic carbon, and $PM_{2.5}$ elemental carbon were moderately correlated (r = 0.55-0.68). PM_{10} and $PM_{2.5}$ mass were moderately correlated with the $PM_{2.5}$ components (r = 0.56-0.77). Acidity and sulfate were highly correlated with each other (r = 0.85) and moderately correlated with ozone (r = 0.64 and 0.63, respectively) and temperature (r = 0.84 and r = 0.64, respectively). The diurnal patterns of CO and NO_2 indicate that mobile source emissions contributed substantially to these pollutant levels. SO_2 levels peaked in both summer and winter, corresponding to peak energy demands. SO_2 levels exhibited marked temporal and spatial variability, with occasional mid-afternoon peaks resulting from power plant plume fumigation events. Compared with other U.S. cities, ozone and $PM_{2.5}$ are relatively high (with sulfate and organic carbon comprising relatively high proportions of $PM_{2.5}$ mass), and acidity is relatively low.16

TABLE 1. Mean, Standard Deviation, and Selected Percentiles of Daily Ambient A Measurements for 5 Criteria Pollutants From the AQS and for Pollutants From the Monitoring Station

The 31 hospitals providing usable data for these analyses receive 80% of the annual emergency department visits in the Atlanta area, and contributed information on 4,407,535 total emergency department visits. Respiratory problems accounted for 11% of all emergency department visits. For the entire study period, average daily outcome counts of the subgroups ranged from 7 for COPD to 103 for URI, and the combined respiratory disease group had an average daily count of 172 (Table 2). For the final 25 months of the study, the 31 hospitals contributed 1,868,973 visits.

TABLE 2. Mean, Standard Deviation, and Selected Percentiles of Daily Counts of Emergency Department Visits at 31 Participating Hospitals for the 2 Time Periods

Results from the a priori single-pollutant models examining 3-day moving averages (lags 0, 1, and 2) of pollutant levels are shown in Table 3. PM_{10}, ozone, NO_2, and CO were individually associated with 1-3% increases of URI visits per standard deviation increase of pollutant; similar results were observed for the combined respiratory disease group (60% of all respiratory visits were for URI). Weak and less stable associations were observed for URI in relation to SO_2, $PM_{2.5}$, and organic carbon. A 20 ppb increase of NO_2 and a 1 ppm increase in CO were associated with 3.5% and 2.8% increases of COPD visits, respectively. Additional estimates for COPD were elevated, but COPD was the smallest outcome group and therefore had the widest confidence intervals. A 2.8% increase in pneumonia visits was associated with a 2 μg/m³ increase of organic carbon. Small increases of asthma visits were observed in relation to standard deviation increases of PM_{10}, ozone, NO_2, and CO; however, the confidence intervals were too wide to exclude a null association. Weak or no associations were observed for the finger wound group. Including daily pollen counts or daily influenza emergency department visits in the models did not affect the observed estimates. General additive models provided similar estimates to those from the a priori models.

TABLE 3. Results of a priori Models for the Association of Daily Ambient Air Quali Measurements With Emergency Department Visits for Respiratory Disease

In the exploratory models assessing the lag structure between pollutant levels and emergency visits (separate models for each lag), the risk ratios for asthma visits were generally positive and strongest with a lag of 5 to 8 days (Fig. 1). The association with ozone appeared to have a shorter lag structure, with the strongest positive associations at lags of 1 and 2 days. The estimates for ultrafine PM count were negative for lags of 0 and 1 day, and positive for lags of 2 through 4 days. The estimates for URI visits were generally highest for the shorter lags (Fig. 2). The gaseous pollutants tended to have stronger positive associations with URI at a lag of 1 day, while the same-day associations were typically stronger for several particle measures (PM_{10}, $PM_{2.5}$, coarse PM, $PM_{2.5}$ components). Sulfate and acidity exhibited a similar trend in relation to URI visits, with positive same-day estimates and negative estimates for a lag of 2 days. Associations for pneumonia and COPD visits were generally positive and strongest for same-day pollutant levels and for levels lagged by 1 day.

FIGURE 1. Risk ratios (diamonds) and 95% CIs (horizontal lines) per standard deviation increase from single-day lag models for the association of emergency department visits for asthma with daily ambient air quality measurements from AQS and the ARIES monitoring station

FIGURE 2. Risk ratios (diamonds) and 95% CIs (horizontal lines) per standard deviation increase from single-day lag models for the association of emergency department visits for upper respiratory illness with daily ambient air quality measurements from AQS and the ARIES monitoring station.

Results from unconstrained distributed lags models (lags of 0-13 days) are presented in Table 4. The risk ratios from models using 3-day moving averages can be interpreted as the risk ratio per unit increase of a uniform 3-day moving average, while risk ratios from the distributed lag models can be interpreted as the risk ratio per unit increase of a weighted 14-day moving average. Estimates from distributed lag models (lags of 0-13 days) tended to be substantially higher than those from models using the 3-day moving average (lags of 0-2 days) for PM_{10}, NO_2, CO, and SO_2, reflecting an additional contribution of days 3-13 in the distributed lag model

TABLE 4. Comparison of Results of a priori 3-Day Moving Average (Lags of 0, 1,

Days) and Unconstrained Distributed Lag (Lags of 0 to 13 Days) Models for the As of Daily Ambient Air Quality Levels With Respiratory Emergency Department Visit

In age-specific analyses, associations for pediatric asthma visits (ages 2-18) in relation to PM_{10} (RR = 1.016 per 10 μg/m^3; 95% CI = 0.998-1.034), NO_2 (1.027 per 20 ppb; 1.005-1.050), and CO (1.019 per ppm; 1.004-1.035) were stronger than those for adult asthma visits. Associations for infant (ages 0-1) and pediatric URI visits were substantially stronger than those for adults. Infant URI visits were associated with PM_{10}, ozone, $PM_{2.5}$ mass, and $PM_{2.5}$ organic carbon (RRs a per standard deviation increase = 1.026-1.042), and pediatric URI visits were associated with these pollutants as well as NO_2 and CO (RRs per standard deviation increase = 1.025-1.047).

The associations for asthma tended to be stronger for several pollutants in the warm months (15 April to 14 October), especially for ozone and $PM_{2.5}$ organic carbon. The estimates for pneumonia and COPD tended to be higher in the cold months.

In sensitivity analyses that varied the numbers of knots in the time splines, there was a tendency toward lower point estimates and larger standard errors as the number of knots increased. (Appendix Table 2 presenting these results is available with the electronic version of this article.) Changing the placement of the knots in the cubic splines for time did not substantially alter the results. Estimates from models using negative lags for pollution, controlling for positive lags, were predominantly null. Results from models for the period 1 August 1998 through 31 August 2000 using the 2 sources of air quality data were not substantially different (Table 5).

TABLE 5. Comparison of Results of a priori Model for the Association of Daily Am Quality Measures With Emergency Department Visits for All Respiratory Disease

Selected multipollutant analyses were performed. For URI visits, risk ratios for ozone were not substantially attenuated when PM_{10}, NO_2, and CO were included in the model (Fig. 3). For COPD, a much smaller outcome group, the risk ratios for both NO_2 and CO were attenuated in a 2-pollutant model (data not shown). As the estimates for asthma visits were somewhat elevated for several pollutants in the a priori models, we examined multipollutant models for asthma including all combinations of PM_{10}, ozone, NO_2, and CO. The estimates for NO_2 were generally not attenuated in multipollutant models, while the estimates for the other pollutants suggested weaker or no associations in the multipollutant models (data not shown).

FIGURE 3. Risk ratios (diamonds) and 95% CIs (horizontal lines) per standard deviation increase from multipollutant models for the association of daily ambient air quality measurements with emergency department visits for upper respiratory illness.

DISCUSSION TOP

This time-series study of respiratory emergency department visits provided a rare opportunity to examine associations of an extensive suite of ambient pollutant measures with specific respiratory conditions. In the a priori single-pollutant models (3-day moving average of lags of 0, 1, and 2 days for pollutant levels), URI visits were positively associated with PM_{10}, ozone, NO_2, and CO. The association with ozone persisted in multipollutant models. The associations observed for URI appeared to be specific to infants and children, COPD was positively associated with NO_2, and CO, while pneumonia was positively associated with $PM_{2.5}$ organic carbon. These results were generally robust to analytic method and model specification. We would expect several positive and negative associations by chance based on the number of tests performed. Overall, the a priori analyses yielded an abundance of positive associations and only a few negative associations.

Though few reasonably strong associations were observed with the PM finer size fraction and PM component measures, these data were available for a shorter time period and thus the estimates were less stable. The ultrafine particle count data, in particular, were missing for 44% of the days, often in blocks of time, which resulted in additional instability of the ultrafine particle models. Ultrafine particle levels also likely have considerable spatial and compositional heterogeneity. Additionally, high concentration days are potentially associated with different types of ultrafine nucleation events.[17,18] Further discussion of the ultrafine PM measurements can be found elsewhere.[17,18]

In single-day lag models, estimates for URI, pneumonia and COPD were stronger for shorter pollutant lag structures (0-2 days), whereas associations for asthma were generally stronger at longer pollutant lags (5-8 days) and persisted for more than a week in distributed lag models. Results from the distributed lag models (lags of 0-13 days) suggest that associations for several of the outcomes persist for longer than the a priori 3-day moving average of lags 0, 1, and 2 days. A longer lag structure is plausible for emergency department visits for less severe respiratory conditions for biologic reasons (an underlying distribution of sensitivity or illness severity in the population) and for behavioral reasons (the time it takes for an exacerbation to become serious enough to necessitate a visit), especially compared with outcomes such as an acute cardiac event.

The results from this study are generally consistent with previously reported associations of ambient air pollution and respiratory morbidity.[1-4] (A brief description and supplemental references are provided in the electronic version of this article.) ED visits for respiratory outcomes have been relatively consistently associated with ozone and PM_{10}, and to a lesser extent with NO_2, SO_2, and CO

In previous studies in Atlanta, which examined only asthma exacerbations, investigators reported associations of PM_{10} and ozone levels with pediatric asthma emergency department visits and hospital admissions in the summer.[19-21] In the present study, a 25 ppb increase in ozone was associated with a 2.6% increase in asthma visits in the warm months. Associations for pediatric asthma visits were somewhat stronger than those for adults for PM_{10}, NO_2 and CO.

Most previous studies that included PM component data (primarily $PM_{2.5}$ sulfate and acidity) have been in the northeastern United States and southeastern Canada.[22-26] Delfino et al[22] observed associations of $PM_{2.5}$ mass and sulfate, as well as of PM_{10} and ozone, with respiratory emergency department visits. Stieb et al[23] also reported positive associations for $PM_{2.5}$ mass and sulfate, as well as for ozone, SO_2, and PM_{10}, with asthma emergency department visits. Associations of acidity and sulfate with respiratory hospital admissions have been observed by several investigators.[24-29] We did not observe any associations for sulfate or acidity in the a priori analyses; however, given the width of the estimated confidence intervals, the study results are not inconsistent with even reasonably strong positive associations of respiratory outcomes with these and other pollutants. Additionally, acidity levels in the previous studies reporting associations with acidity were generally higher than the levels observed in Atlanta for this study.

Our understanding of the biologic mechanisms underlying associations between ambient air pollution and respiratory morbidity is evolving. Inhaled air pollutants may exacerbate existing respiratory disease, resulting in increased reactivity, decreased lung function, and increased respiratory symptoms.[30,31] In addition, inhaled pollutants may enhance the allergic response to an allergen.[32,33]

Many of the pollutant measurements at the ARIES monitoring site appeared to be spatially representative of Atlanta area. Measurements of criteria pollutants were available from both the ARIES and AQS monitoring sites: concentrations measured at the 2 sites were highly correlated and not substantially different in magnitude. Analyses of the ARIES criteria pollutant measurements yielded results comparable to those from analyses of the AQS measurement for the same pollutants. The spatial distribution of ambient $PM_{2.5}$ mass and several of its constituents, including sulfate, organic carbon, and elemental carbon, appeared to be relatively uniform across available monitoring stations; measurements from the ARIES monitoring site were similar to those from other monitoring sites in Atlanta. No information was available to assess the spatial variability for ultrafine particle count or oxygenated hydrocarbons.

Several issues need to be considered in interpreting the single- and multipollutant results. The single-pollutant results are likely confounded, at least in part, by correlated pollutants. Multipollutant models are typically used to address confounding by correlated pollutants, but results from multipollutant models may also be misleading. Pollutants are measured with differing levels of error (including instrument error as well as other sources of error), whereas some potentially important pollutants may not be measured. A pollutant that exhibits a relatively strong association in a multipollutant model may be acting as a surrogate for an unmeasured or poorly measured pollutant

The goal of this study was to assess the association between ambient pollution levels and respiratory morbidity. Ambient pollution levels are of interest for the assessment of population-level health effects of air pollution as well as for regulatory purposes. The measurement error that results from using centrally located monitors is likely to attenuate associations, but would not likely induce spurious associations. Additionally, personal behavior such as air conditioning use or time spent outdoors may affect personal exposure levels. This could affect the magnitude of the observed associations when compared with other locations with different behavior profiles. Eighty-three percent of households in Atlanta have central air conditioning,34 which could weaken associations observed in Atlanta during the warm season relative to those observed in other areas.35 However, in season-specific analyses, associations were often stronger or of similar magnitude in the warm season compared with the cool season or to the year-round analyses, especially for ozone.

We used an a priori approach to reduce possible biases associated with multiple testing and selective reporting of effect estimates. The pollutant metrics, outcome groups of interest, temporal relationship of the pollutant and outcome, and control for temporal trend were chosen prior to examining the data. We then performed secondary analyses to explore the associations further. Although there was some variability when we changed the number of knots to control for time, the overall conclusions would not have been substantially altered had we chosen a model with different knot frequency as the a priori model. We considered over-controlling for time a more conservative alternative to undercontrolling.

In this study, a large sample size and extensive air quality measurements allowed us to examine specific respiratory outcome groups in relation to air pollutants not routinely available for epidemiologic studies. The results contribute to the evidence of an association of several correlated gaseous and particulate pollutants (including ozone, NO_2, CO, PM, and organic carbon) with specific respiratory conditions.

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On Rounding

It is the mark of an educated person to look for precision in each class of things only so far as the nature of the subject permits. - ARISTOTLE

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PARTICULATE AIR POLLUTION AND MORTALITY IN 20 U.S. CITIES, 1987–1994

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ABSTRACT

Background Air pollution in cities has been linked to increased rates of mortality and morbidity in developed and developing countries. Although these findings have helped lead to a tightening of air-quality standards, their validity with respect to public health has been questioned.

Methods We assessed the effects of five major outdoor-air pollutants on daily mortality rates in 20 of the largest cities and metropolitan areas in the United States from 1987 to 1994. The pollutants were particulate matter that is less than 10 μm in aerodynamic diameter (PM_{10}), ozone, carbon monoxide, sulfur dioxide, and nitrogen dioxide. We used a two-stage analytic approach that pooled data from multiple locations.

Results After taking into account potential confounding by other pollutants, we found consistent evidence that the level of PM_{10} is associated with the rate of death from all causes and from cardiovascular and respiratory illnesses. The estimated increase in the relative rate of death from all causes was 0.51 percent (95 percent posterior interval, 0.07 to 0.93 percent) for each increase in the PM_{10} level of 10 μg per cubic meter. The estimated increase in the relative rate of death from cardiovascular and respiratory causes was 0.68 percent (95 percent posterior interval, 0.20 to 1.16 percent) for each increase in the PM_{10} level of 10 μg per cubic meter. There was weaker evidence that increases in ozone levels increased the relative rates of death during the summer, when ozone levels are highest, but not during the winter. Levels of the other pollutants were not significantly related to the mortality rate.

Conclusions There is consistent evidence that the levels of fine particulate matter in the air are associated with the risk of death from all causes and from cardiovascular and respiratory illnesses. These findings strengthen the rationale for controlling the levels of respirable particles in outdoor air. (N Engl J Med 2000;343:1742-9.)

ings is uncertain, and analytic strategies have differed among studies. Citing these limitations, critics have questioned whether the findings indicate an effect of air pollution generally or of particles specifically.[7,12,13]

To address these limitations, we combined information on the associations of levels of the five major outdoor-air pollutants — PM_{10}, ozone, sulfur dioxide, carbon monoxide, and nitrogen dioxide — with daily mortality rates from 20 of the largest U.S. cities.[14] Our estimates are based on a defined sample of the cities; statistical precision was enhanced by combining information from multiple locations.

METHODS

Data Collection

Data were collected from 1987 through 1994. We began with the 20 counties deemed the largest in the 1990 U.S. Census on the basis of population (or with logical groupings of counties), and for the analysis, we used data for the counties that included the associated cities, thus encompassing a population of more than 50 million. Analysis was carried out at the county level because the county was the common coding unit for the various data sets. In this article, we refer to cities and metropolitan areas rather than counties. Daily mortality rates were obtained from the National Center for Health Statistics (Table 1). After excluding deaths from external causes (e.g., accidents, suicide, and homicide) and deaths of nonresidents, we classified the deaths according to age group (<65 years, 65 to 74 years, and ≥75 years) and cause (cardiovascular and respiratory and other).[15] Data on selected demographic characteristics were obtained from the 1990 U.S. Census.[16]

Hourly temperature and dew-point data were available from the EarthInfo compact-disk[17] data base of the National Climatic Data Center. For analysis we used the 24-hour mean value for each day. The air-pollution data were obtained from the data base of the Aerometric Information Retrieval System,[18] which is maintained by the Environmental Protection Agency. For population-oriented monitoring variables, we downloaded all available data for PM_{10}, ozone, carbon monoxide, sulfur dioxide, and nitrogen dioxide. For the pollutants measured on an hourly basis, we calculated the 24-hour average. If the levels of pollutants were monitored at multiple locations in a metropolitan area, we averaged the data. To avoid the potential consequences of outlying values, we excluded the highest and lowest 10 percent of values (10 percent trimmed mean) and then averaged the values for each set of monitors, after the value for each monitor had been corrected for its yearly average.

Statistical Analysis

We used a two-stage log-linear regression model.[19-21] In the first stage, a separate log-linear regression of the daily mortality rate on air-pollution measures and other confounders was fitted to obtain estimates of the relative rate of mortality associated with the pollution variable and the degree of statistical uncertainty for each of

Table 1. Rates of Death from All Causes and from Cardiovascular and Respiratory Causes in 20 U.S. Cities and Metropolitan Areas, According to Various Socioeconomic Characteristics, 1987–1994.*

City or Metropolitan Area	Counties	Population	Mean No. of Deaths/Day	Mean No. of Deaths from Cardiovascular and Respiratory Causes/Day	Annual Income <$12,076	High-School Graduate	Annual Income >$100,000
					percentage of population		
Los Angeles	Los Angeles	8,863,164	148	57	14.8	70.0	7.9
New York	Bronx, Kings, New York, Richmond, Queens, Westchester	7,510,646	190.9	108.3	17.6	71.4	7.8
Chicago	Cook	5,105,067	113.9	62	14.0	73.4	5.6
Dallas–Fort Worth, Tex.	Collin, Dallas, Rockwall, Tarrant	3,312,553	47.0	26	11.7	79.8	5.6
Houston	Harris	2,818,199	39.9	20	15.3	74.8	5.6
San Diego, Calif.	San Diego	2,498,016	41.4	22.6	10.9	81.9	6.0
Santa Ana–Anaheim, Calif.	Orange	2,410,556	37.4	18.7	8.3	81.2	11.0
Phoenix, Ariz.	Maricopa	2,122,101	38.4	20.9	12.1	81.5	4.3
Detroit	Wayne	2,111,687	46.9	24.5	19.8	70.0	3.1
Miami	Dade	1,937,094	41.8	23.6	17.8	65.0	4.9
Philadelphia	Philadelphia	1,585,577	42.3	21.5	10.3	64.3	2.2
Minneapolis	Hennepin, Ramsey	1,518,193	26.3	13.9	9.7	87.2	5.5
Seattle	King	1,507,319	25.6	13.4	7.8	88.2	15.9
San Jose, Calif.	Santa Clara	1,497,577	19.7	10.7	7.3	82.0	13.4
Cleveland	Cuyahoga	1,412,141	35.6	20.1	13.5	74.0	4.0
San Bernardino, Calif.	San Bernardino	1,418,380	20.6	13.1	13.3	75.4	3.9
Pittsburgh	Allegheny	1,336,449	37.4	21.0	11.7	79.0	4.1
Oakland, Calif.	Alameda	1,279,182	22.3	12.2	10.3	81.4	6.7
Atlanta	Fulton, DeKalb	1,196,788	17.6	8.8	14.5	80.6	7.1
San Antonio, Tex.	Bexar	1,185,394	20.1	10.5	19.4	72.7	3.0

*The demographic information was obtained from the 1990 U.S. Census.

the 20 cities. In the second stage, the estimates of the relative rates were combined for all cities (after adjustment for the various levels of uncertainty) to obtain an overall estimate and to assess whether city-specific characteristics modified the estimated effect of air pollution on the relative rate of death.

In the first-stage log-linear regressions, we controlled for possible confounding by longer-term trends resulting from changes in the size and characteristics of the population, health status, and health care and from shorter term effects of seasonality and the presence or absence of influenza epidemics. To do this, we used a flexible function that took into account the variation in the mortality rate over periods of several months (a smoothing function with respect to calendar time with 7 degrees of freedom per year per city, which was allowed to differ in the three age groups). We also adjusted for the short-term effect of weather on the risk of death by including similar smoothing functions with respect to a specific day's temperature and the average temperature for the three days preceding it (6 degrees of freedom) and to dew point (3 degrees of freedom). Finally, we included indicator variables for the day of the week. This model specification was based on extensive, previously reported exploratory analyses.[11,12,22] In this article, our results do not reflect the degrees of freedom used. We have found that the relative rates of air pollution were not sensitive to the number of degrees of freedom selected for the smoothing functions of time, temperature, and dew point.[16,18,21,22]

In the first-stage analysis, we analyzed the effect of the day on which the pollution data were obtained (the current day, the day before, or two days before) on the association with mortality rates. The overall effect did not vary with the lag interval selected. Consequently, we report data for a one-day lag between pollution variables and mortality.

We considered the effects of multiple pollutants on the relative rate of mortality. We initially conducted univariate analyses that included PM_{10} alone and ozone alone. We then considered the effects of these two pollutants in a bivariate model and developed trivariate models that also included sulfur dioxide, nitrogen dioxide, or carbon monoxide. The trivariate models provided estimates of the individual effects of carbon monoxide, sulfur dioxide, and nitrogen dioxide on the risk of death after adjustment for PM_{10} and ozone levels.

The second stage of the analysis provided pooled estimates of the relative rates of mortality associated with specific pollutants and a characterization of the effects of air pollutants among the cities. We also examined factors determining heterogeneity in the effects of air pollution on mortality. With respect to determinants of heterogeneity in the second stage of the analysis, we assumed that first-stage estimates of the relative mortality rates associated with specific pollutants followed a linear regression with the selected city-specific demographic characteristics (Table 1) as predictor variables. The second-stage analysis provided an estimate of the effect of each predictor variable on the relative rate of mortality associated with PM_{10}.

Model fitting was performed with use of a Bayesian statistical approach,[17] which provides an estimate of the posterior distribution of the variable of interest. We carried out this analysis without making a strong prior assumption as to the value of the relative rate. The posterior distribution is used to determine the probability that the relative rate of mortality associated with PM_{10} has a particular value — that is, it is a measure of the strength of the evidence. One important calculation is the posterior probability that the relative rate of mortality associated with PM_{10} is greater than zero. The posterior distribution can also be used to determine the 95 percent posterior intervals. The 95 percent posterior interval encompasses 95 percent of the posterior distribution, a Bayesian formulation similar to the 95 percent confidence interval. All analyses were performed with use of S-Plus statistical software.[24]

RESULTS

The 20 cities and metropolitan areas broadly represented the United States. The number of days for which pollution data were available varied (Table 2). Since the Environmental Protection Agency requires levels of PM_{10} to be measured only every six days, data for ozone and other pollutants were generally available on more days. The mean daily values for PM_{10} ranged from about 20 μg per cubic meter to nearly 50 μg per cubic meter; the present maximal allowable level of PM_{10} in a 24-hour period is 150 μg per cubic meter. The average numbers of deaths per day were substantial, ranging from less than 20 to nearly 200 (Table 1). The correlation coefficients of all correlations between pollutants for all 20 cities and metropolitan areas are provided in Table 3. The correlation structure generally reflects the common sources of the primary combustion-related gases (sulfur dioxide, nitrogen dioxide, and carbon monoxide) and of PM_{10}. The level of ozone was only slightly correlated with that of PM_{10} and was not correlated with the levels of other gaseous pollutants.

In initial univariate analyses, the level of PM_{10} was positively associated with the rate of death from all causes in most of the 20 cities and metropolitan areas (Fig. 1). Adjustment for the effect of ozone levels had little effect on the association, whereas the effects of the ozone level, before and after adjustment for PM_{10} levels, tended to be more variable. The analysis of each pollutant was also stratified according to the cause of death. The city-specific associations between PM_{10} levels and the rate of death from cardiovascular and respiratory causes were similar to those for the rate of death from all causes. A previous univariate analysis stratified according to age showed no age-associated trend.[14]

The combined analysis for all 20 cities and metropolitan areas confirmed the association between PM_{10} levels and the rate of death from all causes (Fig. 2) and of death from cardiovascular and respiratory causes. Figure 3 shows the posterior distributions of the estimated increases in the relative rates of death from all causes associated with each increase in the PM_{10} level of 10 μg per cubic meter before and after adjustment for levels of ozone, nitrogen dioxide, sulfur dioxide, and carbon monoxide, as well as the probability that overall effects are greater than zero for each model. With respect to death from all causes, the distributions are shifted toward the right, with the respective mean increases in the number of deaths per day for each increase in the PM_{10} level of 10 μg per cubic meter (i.e., estimated relative rates) ranging between approximately 0.3 percent and 0.6 percent. An increase in the relative rate of 0.3 percent corresponds to a relative risk of death of 1.003. In the model that included PM_{10} alone, the estimated increase in the relative rate of death from all causes was 0.51 percent for each increase in the PM_{10} level of 10 μg per cubic meter (95 percent posterior interval, 0.07 to 0.93 percent). The posterior distributions of the PM_{10} levels did

TABLE 2. MEAN LEVELS OF POLLUTANTS IN 20 U.S. CITIES AND METROPOLITAN AREAS.*

City or Metropolitan Area	No. of Monitors	No. of Days on Which Data Were Collected: Ozone	No. of Days on Which Data Were Collected: PM_{10}	Ozone	PM_{10}	Nitrogen Dioxide	Sulfur Dioxide	Carbon Monoxide
				ppb	μg/m³		ppb	
Los Angeles	7	2922	584	22.8 (6.9, 40.2)	46.0 (21.5, 73.1)	38.4 (23.3, 56.6)	1.9 (−0.3, 5.0)	15.1 (6.9, 28.3)
New York	15	2922	189	19.4 (7.5, 34.0)	28.8 (16.1, 44.8)	38.9 (27.0, 53.7)	12.9 (4.8, 28.1)	20.0 (14.8, 27.6)
Chicago	16	2922	2483	18.6 (6.1, 32.5)	35.6 (15.7, 60.2)	24.3 (14.4, 35.0)	4.6 (0.8, 10.3)	7.9 (4.5, 11.9)
Dallas–Fort Worth, Tex.	3	2922	624	25.3 (11.6, 41.7)	23.8 (11.4, 39.8)	13.8 (5.9, 23.7)	1.1 (−0.7, 4.2)	7.6 (3.6, 12.0)
Houston	2	2922	791	20.3 (9.2, 35.1)	30.9 (13.5, 48.8)	18.3 (9.0, 29.4)	2.8 (0.6, 5.6)	8.9 (4.0, 14.2)
San Diego, Calif.	4	2922	521	31.6 (18.1, 46.8)	33.6 (15.1, 52.3)	22.9 (11.3, 38.4)	1.7 (−0.3, 4.8)	11.0 (4.6, 20.6)
Santa Ana–Anaheim, Calif.	2	2922	480	23.0 (7.6, 38.5)	37.4 (18.4, 59.2)	36.1 (16.0, 59.0)	1.3 (−0.6, 4.0)	12.3 (3.7, 25.2)
Phoenix, Ariz.	10	2919	436	22.9 (10.3, 35.3)	39.7 (21.4, 68.4)	16.6 (4.6, 36.0)	3.3 (1.0, 6.6)	12.6 (6.4, 22.6)
Detroit	3	2861	1148	22.6 (9.1, 37.5)	40.9 (16.4, 71.1)	21.8 (13.5, 33.2)	6.4 (1.8, 12.6)	6.6 (3.2, 11.1)
Miami	4	2812	434	26.9 (14.3, 40.0)	23.7 (16.0, 36.6)	11.0 (4.8, 20.2)	NA	10.6 (6.8, 15.9)
Philadelphia	3	2901	495	20.8 (3.6, 39.6)	35.4 (19.0, 56.0)	33.2 (20.7, 46.0)	9.9 (1.7, 17.5)	11.9 (7.0, 17.2)
Minneapolis	8	NA	2764	NA	26.9 (10.9, 45.2)	17.0 (8.4, 27.4)	2.6 (0.1, 4.9)	11.8 (7.0, 17.0)
Seattle	7	1820	2205	19.6 (8.7, 30.0)	28.8 (10.2, 44.4)	NA	NA	17.8 (10.3, 26.4)
San Jose, Calif.	3	2921	946	17.9 (7.7, 28.1)	34.4 (9.5, 61.6)	28.1 (11.7, 44.1)	NA	9.4 (3.7, 21.3)
Cleveland	8	1712	1290	27.6 (12.7, 44.9)	45.1 (19.7, 78.7)	26.3 (16.2, 34.7)	10.3 (2.7, 19.9)	8.6 (3.7, 13.8)
San Bernardino, Calif.	8	2922	854	36.9 (14.5, 60.2)	37.0 (16.1, 56.3)	27.8 (10.3, 41.6)	0.7 (−0.7, 3.0)	10.3 (4.0, 17.6)
Pittsburgh	30	2551	2597	20.7 (7.0, 30.0)	31.6 (8.9, 61.7)	27.6 (17.6, 35.0)	14.2 (4.5, 26.6)	12.2 (6.1, 19.8)
Oakland, Calif.	3	2922	508	17.2 (7.7, 26.9)	26.1 (9.3, 47.3)	21.3 (9.6, 35.2)	NA	5.1 (2.9, 17.0)
Atlanta	3	2200	482	24.5 (11.6, 37.4)	34.4 (15.8, 56.4)	25.6 (11.7, 30.4)	6 (0.4, 10.0)	8 (3.3, 14.3)
San Antonio, Tex.	2	2913	670	22.2 (11.6, 34.6)	28.8 (12.3, 36.3)	NA	NA	10.1 (4.1, 17.5)

*Cities are listed according to sample population size. Values shown are 10 percent trimmed means, as described in the Methods section. Values in parentheses are the 10th and 90th percentiles. PM_{10} denotes particulate matter that is less than 10 μm in aerodynamic diameter, and NA not available.

TABLE 3. CORRELATION COEFFICIENTS OF ALL PAIRWISE CORRELATIONS BETWEEN POLLUTANTS FOR THE 20 CITIES AND METROPOLITAN AREAS.*

Pollutant	PM_{10}	Ozone	Nitrogen Dioxide	Sulfur Dioxide	Carbon Monoxide
			median (10th and 90th percentiles)		
PM_{10}	1.00	0.34 (−0.21, 0.47)	0.53 (0.32, 0.74)	0.39 (0.16, 0.61)	0.46 (0.13, 0.67)
Ozone		1.00	0.02 (−0.14, 0.20)	−0.04 (−0.31, 0.09)	−0.19 (−0.52, −0.04)
Nitrogen dioxide			1.00	0.41 (0.22, 0.70)	0.64 (0.51, 0.86)
Sulfur dioxide				1.00	0.41 (0.30, 0.73)
Carbon monoxide					1.00

*The correlation coefficients were calculated for values for all monitors within the cities. PM_{10} denotes particulate matter that is less than 10 μm in aerodynamic diameter.

nor change substantially after adjustment for the other pollutants, suggesting that the univariate findings were not affected by confounding by other pollutants (Fig. 2).

The PM_{10} level had a somewhat greater effect on the rate of death from cardiovascular and respiratory causes than on the rate of death from all causes and was associated with a correspondingly larger probability that the effect was greater than zero. The estimated increase in the relative rate of death from cardiovascular and respiratory causes was 0.68 percent for each increase of 10 μg per cubic meter in the PM_{10} level (95 percent posterior interval, 0.20 to 1.16 percent).

The univariate effects of ozone levels were examined during a one-year period and according to sea-

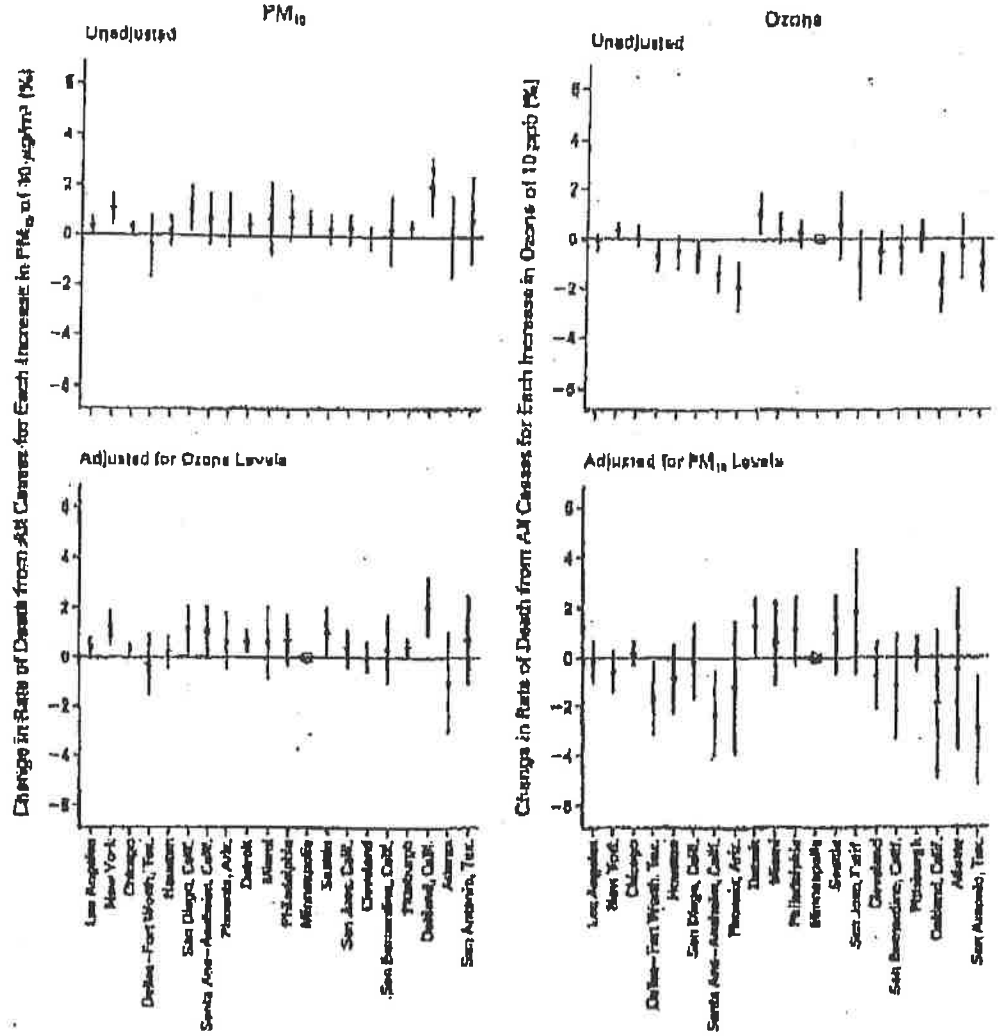

Figure 1. Regression Coefficients for the Changes in the Rate of Death from All Causes for Each Increase in the PM$_{10}$ Level of 10 μg per Cubic Meter, before and after Adjustment for Ozone Levels, and for Each Increase in the Ozone Level of 10 ppb, before and after Adjustment for PM$_{10}$ Levels in 20 Cities and Metropolitan Areas.

PM$_{10}$ denotes particulate matter that is less than 10 μm in aerodynamic diameter. Bars indicate 95 percent confidence intervals. No data on ozone were available for Minneapolis.

son. Overall, the posterior distributions of the effects of ozone were concentrated near zero, and there was only an even chance that the effect was larger than zero when death from all causes and death from cardiovascular and respiratory causes were considered separately. Because ozone levels vary strongly with the season, we compared the effects of ozone levels during the three hottest summer months (June, July, and August), when levels are highest, and three cold months (November, December, and January), when levels tend to be lowest. With the use of this stratification, the estimated relative rates of death from all

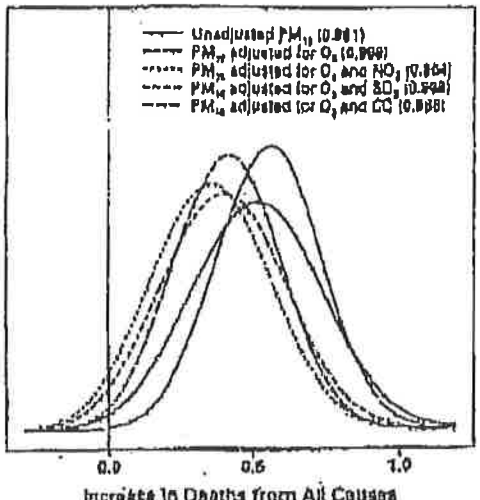

Figure 2. Posterior Distributions of the Overall Relative Rate of Increase in Death from All Causes for Each Increase in the PM_{10} Level of 10 μg per Cubic Meter, before and after Adjustment for the Levels of Ozone (O_3), Nitrogen Dioxide (NO_2), Sulfur Dioxide (SO_2), and Carbon Monoxide (CO).

Values in parentheses are the posterior probabilities that the overall effects are greater than zero. PM_{10} denotes particulate matter that is less than 10 μm in aerodynamic diameter.

causes with each increase in the ozone level of 10 ppb were 0.41 percent (95 percent posterior interval, −0.20 to 1.01 percent) during the summer months and −1.83 percent (95 percent posterior interval, −2.69 to −0.96 percent) during the cold months.

The differences between cities in the relative rates did not depend on average PM_{10} or ozone levels in a city or on city-specific demographic characteristics; for these variables, all associated 95 percent posterior intervals included zero. Consequently, the analyses and results for PM_{10} were not adjusted for these city-specific characteristics.

We also analyzed the effects of levels of carbon monoxide, sulfur dioxide, and nitrogen dioxide in a fashion similar to that of the analysis of PM_{10} levels. After adjustment for PM_{10} and ozone levels, we found little evidence that these pollutants had a significant effect on the relative rate of death.

DISCUSSION

We found consistent evidence that the level of PM_{10} is associated with the rates of death from all causes and from cardiovascular and respiratory causes. The association of PM_{10} was not affected by the inclusion of other pollutants in the statistical model or by the time at which data were collected. Our findings strongly support the findings of prior studies of particulate matter and mortality.[26] These studies, which were largely based on data from single cities, used a variety of measures of particulate matter, including levels of total suspended particles, black smoke (a measure of soiling of a filter that provides an index of particle levels), PM_{10}, and $PM_{2.5}$. The statistical methods used to assess the relations between levels of pollution and the risk of death were also heterogeneous; for example, there was no uniformity in the approaches used to control for factors that varied over time or for other pollutants. Nonetheless, using a weight-of-evidence approach, the Environmental Protection Agency interpreted the results of the studies as indicating a possibly causal association between levels of particulate matter and adverse effects on health.[3]

In a meta-analysis of U.S. studies of particulate air pollution published between 1990 and 1993, Dockery and Pope[2] estimated that each increase in the PM_{10} level of 10 μg per cubic meter increased the relative rate of death from all causes by 1 percent. In a subsequent update that included data from reports published through 1995, Dockery and Pope found little change in this estimate.[27] Schwartz[28] also performed a meta-analysis of studies published between 1990 and 1993 but included data from London and Minneapolis in addition to the data on the eight cities considered by Dockery and Pope. The resulting estimated increase in the relative rate of death from all causes was 0.7 percent for each increase in the PM_{10} level of 10 μg per cubic meter. The APHEA project analyzed data from 12 European cities and then estimated summary measures. For the six western European cities in the study, the mortality rate was estimated to increase by 0.4 percent for each increase in the PM_{10} level of 10 μg per cubic meter. In our 20-city analysis, our estimate of an increase of approximately 0.5 percent in the rate of death from all causes for each increase in the PM_{10} level of 10 μg per cubic meter is very similar to the estimate of the APHEA project.[10] The fact that our estimate was lower than those of Dockery and Pope[2] and Schwartz[28] may reflect differences in analytic techniques and the cities selected. The initial reports included in the meta-analyses may have been biased by the fact that studies with positive findings are more likely to be selected for publication than those with negative findings. Our 20-city estimate is not subject to such bias and our results should thus be more applicable to the United States in general.

We did not find an effect of ozone levels on the overall rate of death from all causes or from cardiovascular and respiratory causes during the full year period. Ozone levels were positively associated with mortality rates during the summer months when ozone levels were highest, although the 95 percent posterior interval extended into the range indicating no effect of ozone levels on mortality. The finding of an effect of ozone levels only during the summer may reflect the higher levels of ozone during these months or, possibly, differences in the characteristics of photochemical pollution during the various seasons. Other recent studies have generally found an association between ozone levels and the risk of death.[29] In the APHEA project, the maximal ozone levels during a one-hour period were associated with the numbers of deaths per day in four cities (London; Athens, Greece; Barcelona, Spain; and Paris), and a quantitatively similar effect was found with additional data from three cities (Amsterdam; and Basel and Zurich, Switzerland) that were not part of the APHEA project.[30] For each increase of 50 μg per cubic meter in the one-hour maximal level, the estimated relative risk of death was 1.029 (i.e., a 1.1 percent increase in the rate of death for each increase in the ozone level of 10 ppb), with the use of a random-effects model for combining the city-specific data. Thurston and Ito[29] pooled data from 15 studies and estimated that the relative risk of death was 1.036 for each increase of 100 ppb in the daily one-hour maximal level of ozone (i.e., a 0.36 percent increase in the rate of death for each increase in the ozone level of 10 ppb). For the summer months, our estimate (a 0.41 percent increase in the rate of death for each increase in the ozone level of 10 ppb) was similar to those of Thurston and Ito. Taken together, the results of these three studies provide consistent evidence that exposure to ozone also increases the risk of death.

The limitations of our analyses should be considered. Data on levels of $PM_{2.5}$ are not yet available nationally, since a monitoring network for particles in this size range is currently being implemented. We used PM_{10} levels because they have been monitored since 1987; there is variation across the United States in the proportion of PM_{10} mass that is made up of $PM_{2.5}$, so that the PM_{10} level is an imperfect surrogate for the $PM_{2.5}$ level.[3] In addition, for regulatory purposes, PM_{10} levels must only be measured every six days, limiting the extent of available data.

Our analyses also did not address the extent to which life is shortened in association with daily exposure to the various pollutants. The finding that the association between PM_{10} levels and the risk of death was strongest for cardiovascular and respiratory causes of death is consistent with the hypothesis that persons made frail by advanced heart and lung disease are more susceptible to the adverse effects of air pollution. The findings from several epidemiologic studies of the longer-term effects of air pollution on the risk of death suggest that exposure to air pollution may do more than simply shorten life by a few days.[31,32] Several analyses of daily mortality data also indicate that the effect of air pollution may go beyond shortening life by a few days.[33,34]

We found no evidence that key socioeconomic factors such as low socioeconomic status affect the association between PM_{10} levels and the risk of death in linear regression models. The medical conditions and poor health that increase the risk of death may not be adequately reflected by the socioeconomic indicators recorded by the U.S. Census. Thus, more specific information on health status, rather than on social factors, may be needed to explore this issue, particularly in relation to the susceptibility of particular groups of people. Finally, we used county-level data for these social factors because most of our data were categorized according to county. The variation in socioeconomic status in a typical urban county, however, is usually considerably larger than the variation among counties. Thus, the demographic factors considered in the second stages of the models may be too broad to be informative.

The epidemiologic evidence that levels of particulate matter are associated with the risk of mortality and morbidity has prompted the promulgation of a new standard for $PM_{2.5}$ in the United States and a rethinking of guidelines for particulate matter in Europe. Our analyses provide evidence that particulate air pollution continues to have an adverse effect on the public's health and strengthen the rationale for limiting levels of respirable particles in outdoor air.

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Response to Comment No. 1:

Thank you for indicating Environmental Defense's dedication to protecting the environmental rights of all people and providing comments indicating the inadequacy of the project description. The EIR hopes to address the comments regarding the adequacy of the Draft EIR project description and the noise analysis in Section B of the letter. Article 9, Section 15124 of the State CEQA Guidelines[3] requires that the project be described in a way that is meaningful to the public, to the other reviewing agencies, and to the decision makers. CEQA states that the "project description should not supply extensive detail beyond those needed for evaluation and review of the environmental impacts." Per CEQA requirements, the project description in the Draft EIR adequately describes: (1) the project location and boundaries of the proposed project on a topographic map, as well as the location of the project on a regional map; (2) a statement of objectives underlying the purpose of the proposed project; (3) a description of the proposed project's technical, economic, and environmental characteristics; and (4) a statement describing the intended uses of the EIR.

The Draft EIR contains an accurate, stable, and finite project description (Draft EIR, Section 2.2, Existing Conditions). It includes the following subsections with appropriate maps and figures:

- 2.1 Project Location
- 2.2 Existing Conditions
- 2.3 Statement of Objectives
- 2.4 Proposed Project
  - 2.4.1 Master Plan of Land Uses
  - 2.4.2 Todd Cancer Institute
  - 2.4.3 Miller Children's Hospital–Pediatric Inpatient Tower, Utility Trench, and Central Plant Building
  - 2.4.4 Miller Children's Hospital–Pediatric Outpatient Building
  - 2.4.5 Miller Children's Hospital–Link Building
  - 2.4.6 Roadway Realignment
  - 2.4.7 Parking Program
  - 2.4.8 Construction Scenario
- 2.5 Intended Uses of the EIR
- 2.6 Related Projects
- 2.7 Project Alternatives

The EIR also hopes to address the comments and concerns regarding the general approach and technical qualifications used in the noise impact analysis completed by VSA and Associates (VSA). The potential for the proposed project to result in impacts related to noise was analyzed in relation to the questions contained in Appendix G of the State CEQA Guidelines.

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[3] State of California. *California Code of Regulations*. Title 14, Article 9, Section 15124: "Project Description." Available at: http://ceres.ca.gov/topic/env_law/ceqa/guidelines/art9.html

The proposed project would normally be considered to have a significant impact to noise when the potential for any one of the following six thresholds occurs:

1. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies

2. Exposure of persons to or generation of excessive ground-borne vibration

3. A substantial permanent increase in ambient noise levels in the proposed project vicinity above levels existing without the proposed project

4. A substantial temporary or periodic increase in ambient noise levels in the proposed project vicinity above levels existing without the proposed project

5. For a proposed project located within an airport land use plan or where such a plan has not been adopted within 2 miles of a public airport, exposure of persons residing or working in the proposed project area to excessive noise levels

6. For a proposed project within the vicinity of a private airstrip, exposure of persons residing or working in the proposed project area to excessive noise levels

The noise impact analysis methodology used in the technical report for the Draft EIR was based on methodologies provided by the County of Los Angeles Streamlined General Plan,[4] the Noise Control Ordinance of the County of Los Angeles,[5] and the site-specific acoustical analysis and modeling undertaken for the proposed project. This approach is expanded on in pages 3.9-9 through 3.9-10, of Section 3.9, Noise, of the Draft EIR. The significance of impacts to the ambient noise environment was considered in relation to the magnitude of the community noise equivalent level (CNEL) increase and the potential to change the community noise exposure. The EIR states that the proposed project would have a less than significant impact related to noise when mitigation measures are implemented. Therefore, the Draft EIR adequately analyzes the impacts that the proposed project will have on noise through construction, vibration, and operational noise.

The Draft EIR identifies that although there is no mitigation measure that would completely eliminate potential noise generation from construction, Noise-1 through Noise-3 would reduce potential impacts related to noise to below the level of significance. The specified mitigation measures Noise-1 through Noise-3 have been discussed in the Draft EIR (Section 3.9, Noise, page 3.9-19). Implementation of these mitigation measures would reduce potential impacts related to noise to below the level of significance. To ensure implementation of mitigation measures, the City of Long Beach shall require that the plans and specifications for the Miller Children's Hospital pediatric inpatient tower and the central plant building require that construction equipment shall be equipped with state-of-the-art noise-muffling devices. Barriers or curtains shall be required to be installed close to equipment to shield the equipment from the receiver. The height and length of the barriers or curtains shall be determined based on location of construction activity and receiver.

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[4] County of Los Angeles, Department of Regional Planning. 1993. *Streamlined County of Los Angeles General Plan.* Contact: 320 West Temple Street, Room 1348, Los Angeles, CA 90012.

[5] County of Los Angeles. 1978. Noise Control Ordinance of the County of Los Angeles. Ord. 1, 1778, § 2 (Art. 1, § 101) and Ord. 1, 1773, § 2 (Art. 1, § 101). Chapter 12.08. Available at: http://ordlink.com/codes/lacounty/index.htm

SCS Engineers has prepared the HRA consistent with DTSC and U.S. Environmental Protection Agency (EPA) risk assessment guidance. A supplement to the HRA will be prepared based on the data from the current site investigation, which is being conducted under DTSC oversight. The HRAs and supplements will be reviewed by the DTSC for consistency with DTSC risk assessment policy and guidance. Finally, portions of the HRA were developed in direct consultation with DTSC staff. In addition, to ensure the quality of the HRA, the City of Long Beach requires a peer review by a third party, Kleinfelder, one of the leading consulting engineering firm nationwide. SCS Engineers's HRA staff résumés are attached (Appendix M, *Résumés*).

Response to Comment No. 2:

Thank you for providing information for consultants. However, the consultants are not from California. The comments provided for the technical team from the Draft EIR experts are included in the response to Comment No. 1.

Response to Comment No. 3:

Thank you for the comment. Page ES-1 of Section ES, Executive Summary, of the Draft EIR explains that the 54-acre Campus is completely developed and characterized by six general land uses: (1) inpatient medical facilities, (2) outpatient medical facilities, (3) mixed-use facilities (includes 51 residential units), (4) utilities, (5) circulation, and (6) parking. The Draft EIR also explains that there are approximately 1,213,945 gross SF of structures located within the Campus. The Draft EIR explains that there are two licensed hospitals within the Campus: the LBMMC and MCH. These facilities are centrally located in the center of the Campus, north of 27th Street, east of Long Beach Boulevard, south of Columbia Street, and west of Atlantic Avenue. The Draft EIR specifies that in addition to inpatient services, outpatient services are provided in structures located in the northern portion of the Campus.

Response to Comment No. 4:

Tom Brohard's review of the Draft EIR disclosed numerous errors and internal inconsistencies in the project description and issues associated with the proposed expansion project that have not been properly or adequately addressed. In reference to Tom Brohard's comments and suggestions, Linscott, Law and Greenspan (LLG) will provide support for their analysis and the approach taken to analyzing the traffic and transportation impacts at the proposed project site. The traffic analysis methodology and approach will be discussed in detail in the following Response to Comment No. 5 through Response to Comment No. 12.

Article 9, Section 15124 of the State CEQA Guidelines[6] requires that the project description describe the proposed project in a way that is meaningful to the public, to the other reviewing agencies, and to the decision makers. CEQA also states that the "project description should not supply extensive detail beyond that needed for evaluation and review of the environmental impact." Per CEQA requirements, the project description in the Draft EIR adequately describes the proposed project. The Draft EIR contains an accurate, stable, and finite project description (Section 2.0, Project Description, of the Draft EIR). It includes all the subsections with appropriate maps and figures as required by CEQA.

[6] State of California. *California Code of Regulations*. Title 14, Article 9, Section 15124: "Project Description." Available at: http://ceres.ca.gov/topic/env_law/ceqa/guidelines/art9.html

Response to Comment No. 5:

Thank you for the comment. In response to the position regarding the adequacy of the Draft EIR project description and the entire traffic analysis in Section B of the letter, the EIR hopes to address the comments and concerns regarding the project description and to defend the general approach and technical qualifications used in the Traffic Impact Analysis completed by LLG. The traffic impact analysis methodology used in this report was based on a multistep process analysis. First, traffic generation, which estimates the total arriving and departing traffic on a peak-hour and daily basis, is estimated. The traffic generation potential is forecasted by applying the appropriate vehicle trip generation equations or rates to the project development tabulation. Second, traffic distribution is forecasted, which identifies the origins and destinations of inbound and outbound project traffic. These origins and destinations are typically based on demographics and existing/expected future travel patterns in the study area. Third, traffic assignment is completed, which involves the allocation of project traffic to study area streets and intersections. Traffic assignment is typically based on minimization of travel time, which may or may not involve the shortest route, depending on prevailing operating conditions and travel speeds. Traffic distribution patterns are indicated by general percentage orientation, whereas traffic assignment allocates specific volume forecasts to individual roadway links and intersection turning movements throughout the study area.

With the forecasting process completed and project traffic assignments developed, the impact of the proposed project is isolated by comparing operational LOS conditions at selected key intersections using expected future traffic volumes with and without forecast project traffic. The need for site-specific and/or cumulative local area traffic improvements can then be evaluated. Thus, the analysis is based on the future operating conditions at the 28 key study intersections, both without and with the proposed project. The capacity analysis procedures were utilized to investigate the future volume-to-capacity relationships and LOS characteristics at each study intersection. With this information, the Traffic Impact Analysis was also designed to be consistent with related policy requirements and recommendations documented in the Transportation element of the City of Long Beach General Plan.[7] A list of the LLG technical staff, project engineers, senior project manager qualifications and experience including related project experience in the area is provided as Appendix M. LLG fully defends the traffic analysis as accurate evidence for the record and will provide additional analysis if necessary if far more significant adverse environmental impacts are expected.

Response to Comment No. 6:

Tom Brohard's review of the Draft EIR disclosed numerous errors for transportation, traffic, and parking issues associated with the proposed expansion project that have not been properly or adequately addressed. Specific errors were mentioned regarding trip generation, as well as the approach and foundation of the traffic impact analysis, suggesting that the entire traffic analysis is incorrect. In reference to Tom Brohard's comments and suggestions, LLG will provide support for their analysis and the approach taken to analysis the traffic and transportation impacts below.

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[7] City of Long Beach, Department of Planning and Building. December 1991. *Transportation Element of the Long Beach General Plan.* Prepared by: City of Long Beach, Department of Planning and Building, City Hall, 333 West Ocean Boulevard, Long Beach, CA 90802.

The trip generation presented in this analysis is based on standard industry data contained in the Institute of Transportation Engineers (ITE) manual.[8] The use of beds as the trip generation independent variable is appropriate for several reasons. First, the bed independent variable refers to a fixed number of bedroom/treatment areas, which do not change over time and is linked to all uses within a hospital structure regardless of the hospital square footage, which can vary between designs. As a result, the most appropriate trip generation independent variable is the variable that has consistent function throughout similar uses regardless of the design square footage, such as beds within a hospital. Second, as presented in the ITE manual, the average daily trip (ADT) generation is based on the bed data from 20 studies versus square-footage data from 14 studies, and the a.m. and p.m. peak-hour generation is based on the bed data from 8 studies versus square-footage data from 7 studies. As a result, the traffic generation based on beds provides a greater volume of empirical data than square footage with similar coefficients of determination (R^2) and, therefore, is most appropriate to utilize in the trip generation forecast for hospitals. Finally, the use of beds for hospital expansion projects is also the most appropriate traffic generation independent variable because the function of the additional beds/treatment areas remains the same but the additional square-footage improvements often address upgrading of existing antiquated facilities to modern standards without creating additional employees or patients and, therefore, would not generate any additional traffic. As a result, basing the hospital expansion trip generation forecast on square footage could significantly overestimate the trip generation.

Response to Comment No. 7:

Thank you for the comments regarding the traffic analysis from Mr. Tom Brohard on behalf of Environmental Defense. Traffic generation is expressed in vehicle trip ends, defined as one-way vehicular movements, either entering or exiting the generating land use. Generation factors and equations used in the traffic-forecasting procedure are typically found in the ITE manual.

The trip generation potential for the MCH pediatric inpatient tower was estimated using the ITE rates for Land Use Code 610: Hospital, whereas the trip generation potentials for the TCI and MCH pediatric outpatient building were estimated using the ITE rates for Land Use Code 720: Medical-Dental Office Building.

The two potential hospital trip generation variables (i.e., hospital beds versus total hospital building square footage) and resultant trip generation were compared to determine which variable resulted in the most appropriate and more conservative trip generation forecast. Given that the proposed project is an expansion to the existing medical campus, one must compare the two trip generation variables using the existing plus proposed square footage for the hospital expansion or the existing plus proposed number of beds for the hospital expansion. Using a total bed count of 445 beds (281 existing beds plus 164 proposed beds) results in a more conservative trip generation forecast than using a total square footage of 373,162 SF (175,162 SF + 198,000 SF). As shown in Table 13.2.5-2, *Trip Generation Comparison*, a total bed count of 445 beds results in 5,256 daily trips with 503 a.m. peak-hour trips and 578 p.m. peak-hour trips. A total square footage of 373,162 SF results in 6,556 daily trips with 448 a.m. peak-hour trips and 440 p.m. peak-hour trips. Based on this trip generation comparison, the trip generation forecast for the proposed project contained in the Draft EIR is accurate and more conservative during the a.m. and p.m. peak hours, which are analyzed in the traffic impact analysis.

[8] Institute of Transportation Engineers. 2003. *Trip Generation*. Seventh Edition. Washington, DC: Institute of Transportation Engineers.

TABLE 13.2.5-2
TRIP GENERATION COMPARISON

Land Use	Beds			Square Footage		
	Daily	Total A.M.	Total P.M.	Daily	Total A.M.	Total P.M.
Existing MCH (175,162 SF, 281 Beds)	3,319	318	365	3,078	210	206
Phase I MCH Expansion (124,500 SF, 72 Beds)	850	81	94	2,187	150	147
Phase II MCH Expansion (73,500 SF, 92 Beds)	1,087	104	119	1,291	88	87
Total MCH (373,162 SF, 445 Beds)	**5,256**	**503**	**578**	**6,556**	**448**	**440**

The traffic impact of this hospital expansion project is based on the volume of new traffic forecast to be generated by the addition of 164 Beds within 198,000 SF. As presented in Table 13.2.5-2, the existing traffic generation for the hospital varies significantly between the *beds* variable and the *square-footage* variable based on ITE manual. Because the existing hospital is old in design and the function of the beds has remained the same over time, the existing trip generation based on beds is the most accurate, which indicates that the existing trip generation based on square footage is significantly understated. In addition, another measure of appropriateness would be to compare both trip generation forecasts at build-out of the hospital because the total trip generation is the greatest measure of impact potential on the surrounding system. Based on the total trip generation shown above, the beds variable trip generation is anticipated to generate 55 greater a.m. peak-hour trips, 138 greater p.m. peak-hour trips, and 1,300 fewer daily trips, which indicates that the beds independent variable trip generation creates the most conservative approach for conducting the Traffic Impact Analysis on the surrounding system. In addition, the use of trip generation equations for generating the expansion traffic generation forecast as an increment of the entire development is inappropriate as it significantly distorts the proportion of total traffic to be generated by an expansion project. The ITE hospital equation for the total square footage could still be applied, but it would generate fewer a.m. and p.m. peak-hour trips than the beds variable trip generation. Using these equations, the total square footage (373,162 SF) is expected to generate 5,945 daily trips with 485 a.m. peak-hour trips and 499 p.m. peak-hour trips. Based on the total trip generation shown above, the beds variable trip generation is anticipated to generate 18 greater a.m. peak-hour trips, 79 greater p.m. peak-hour trips, and 689 fewer daily trips.

The MCH link building will consist of a three-story, 20,000-square-foot building that would contain retail spaces, offices, and retail food service for the users of the adjacent pediatric inpatient tower and pediatric outpatient building. The MCH link building is a part of the MCH pediatric inpatient tower and will house only appurtenant uses. The trip generation of the proposed link building is accounted for by the trip generation of the MCH pediatric inpatient tower expansion (through additional beds).

Response to Comment No. 8:

In addition to the I-405, which provides primary regional access to the proposed project site via Long Beach Boulevard, Atlantic Avenue, Orange Avenue, and the 32nd Street interchange, existing public transit is available to provide services for the proposed project. These public transit services include the Long Beach Transit (LBT) and the Metro Blue Line Light Rail Transit System. The 2004 Congestion Management Program (CMP) for the County of Los Angeles requires a review of the

CMP transit service. Pursuant to the CMP guidelines, the proposed project is forecasted to generate 146 transit trips (112 inbound and 34 outbound) during the a.m. peak hour and 206 transit trips (60 inbound and 146 outbound) during the p.m. peak hour. Over a 24-hour period, the proposed project is forecasted to generate 1,969 daily weekday transit trips.

It is anticipated that the existing transit service in the proposed project area would be able to accommodate the project-generated transit trips. Review of the current Long Beach Transit System Map indicates that the proposed project site is currently serviced by LBT bus routes 51 and 52, which travel north and south on Long Beach Boulevard adjacent to the site, and LBT bus routes 61, 62, 63, 66, 101, and 103, which travel along Atlantic Avenue. During the a.m. and p.m. peak hours, the proposed project site vicinity is currently served by approximately 20 buses per hour during the a.m. and p.m. peak hours. Thus, the proposed project would generate approximately 7 new boardings per bus in the a.m. peak hour and 10 new boardings per bus during p.m. peak hour.

Because the CMP does not provide guidance as to what constitutes a transit impact, it cannot be determined whether these person trips would have a significant impact. However, given the existing transit routes in the proposed project vicinity, it is concluded that the public transit system would not be significantly impacted by the proposed project.

Response to Comment No. 9:

Significant project traffic impacts in year 2008 have been identified at the 11 intersections analyzed. Mr. Brohard found that only 10 of these intersections are listed in the section involving mitigation measures and that the Draft EIR concluded that the impacts to 5 of 10 intersections would not be mitigated to below the level of significance.

Based on the Traffic Impact Analysis provided by LLG, the Draft EIR should have stated that for the year 2008 and year 2014 planning horizon, 3 (not five) of the 10 intersections would not be mitigated to below the level of significance. Next, the reason that only 10 of these intersections include mitigation measures is that the mitigation measure for the 11th intersection, Pasadena Avenue and Willow Street, is incorporated into project-specific improvements, which is a part of the project description. This mitigation measure involves the installation of a two-phase traffic signal.

The reason that the three intersections at Atlantic Avenue and Willow Street, Long Beach Boulevard and Willow Street, and Long Beach Boulevard and Wardlow Road are significantly impacted and dismissed by the statement, "no physical mitigation measure is feasible," is based on a meeting with City staff. In this meeting, potential mitigation measures were discussed for the three intersections identified above. In all instances, the potential improvements required widening and the acquisition of additional right-of-way. The City staff felt that these mitigation measures were not feasible and that this impact will need to be documented in the Draft EIR as a "significant and unavoidable" project traffic impact.

Response to Comment No. 10:

Thank you for the comments on behalf of Environmental Defense. The letter listed several mitigation recommendations by Mr. Tom Brohard for intersections that the Traffic Impact Analysis stated were not feasible. For example, the letter states that "the parking analysis fails to consider fragmented parking supply as well as limitations on the use of specified parking areas." Consistent with the City of Long Beach requirements, the number of parking spaces required for the existing and proposed uses of the Campus was calculated using parking codes per the City of Long Beach Title 21 Zoning Regulations, Chapter 21.41, "Off-Street Parking and Loading Requirements." The zoning code specifies a parking ratio of two spaces per bed for hospitals and five spaces per 1,000 gross floor area (GFA) of medical office uses. This tabulation is provided in Table 3.11.4-3, *City Code Parking Requirements*. In the Draft EIR, the numbers in Table 3.11.4-3 did not match the information in Table 13-1 of the traffic study located in Appendix J. Although the data in Table 13-1 were correct at the time of the Traffic Impact Analysis, Table 3.11.4-3 has the most updated data for hospital beds.

The existing facilities have a City of Long Beach code parking requirement of 3,187 spaces. With an existing parking supply of 3,452 parking spaces, and a combined code parking requirement of 4,653 spaces, the Campus will require an additional (net) 1,201 parking spaces when compared to the City of Long Beach parking code requirement. Based on results of parking occupancy study completed in 2002, and empirical parking ratios that were derived from the study, it was determined that the proposed project would require 1,495 parking spaces. Based on City code, the proposed project would require 1,466 spaces.

Using the findings and recommendations of the LLG parking evaluation, the Campus, at completion of the proposed expansion, would require 4,812 parking spaces (3,317 + 1,495). With an existing parking supply of 3,452 parking spaces, an additional (net) 1,360 parking spaces would be required. The LLG parking occupancy study results in 159 more parking spaces than required by City code. The Parking Demand Occupancy Study completed by LLG is included in Appendix N of the EIR.

Response to Comment No. 11:

Thank you for the comment regarding inconsistencies between the project description of the component sizes and schedules compared to those used in the analysis of parking during various phases of construction. Mr. Brohard lists several of these inconsistencies found for the TCI Phase I and Phase II portions of the proposed project and the MCH Phase I and Phase II portions of the project. The following corrections will be noted in the Final EIR: TCI Phase I is expected to be completed in September 2006. TCI Phase II is 42,300 SF, MCH Phase I is 124,500 SF, and MCH Phase II is 73,500 SF.

Response to Comment No. 12:

Thank you for the comments regarding potential health-related links between traffic impacts and air emissions that would cause potential increases in air pollutants or create hot spots. The letter suggests additional analysis to be completed for the human health impacts from air impacts resulting from elevated diesel exhaust emissions on sensitive receptors. In reference to this analysis, the letter also notes "Ambient Air Pollution and Cardiovascular Emergency Department Visits," an epidemiological study in the *Epidemiological Journals* completed by John Williams. Instead of completing a case-control study, cohort study, or cross-sectional study or calculating a risk ratio (RR), Sapphos Environmental, Inc. retained the services of SCS Engineers to complete an HRA and an air quality analysis pursuant to State CEQA Guidelines that adequately covers an exposure assessment for the sensitive receptors and human populations in the Long Beach community that may experience adverse health impacts. This was done because an epidemiological study would have been time consuming and expensive due to loss of follow-up on study subjects, low participation rates, and funding.

Epidemiological studies collectively indicate that exposure to particulate matter (PM) and/or diesel exhaust air pollution can be associated with the exacerbation of asthma and other respiratory effects, and persons living near higher truck traffic have higher rates of respiratory morbidity, suggesting a link with higher diesel particle concentrations. However, studies of personal exposures to diesel particles and health effects are largely lacking, especially among potentially sensitive populations. The need for immediate, adequate health care and improved hospital facilities in the City of Long Beach override many of the needs for an epidemiological investigation and surveillance studies in the Long Beach community. The EIR hopes that the impacts assessed and documented in the HRA and the air quality analysis adequately address the concerns.

As previously stated in Comment No. 7, the MCH link building will consist of a three-story, 20,000-square-foot building that would contain retail spaces, offices, and retail food service for the users of the adjacent pediatric inpatient tower and pediatric outpatient building. The MCH link building is a part of the MCH pediatric inpatient tower and will house only appurtenant uses. The trip generation of the proposed link building is accounted for by the trip generation of the MCH pediatric inpatient tower expansion (through additional beds).

Response to Comment No. 13:

SCS Engineers based their analysis on the ambient air standards recommended by the SCAQMD handbook.[9] The SCAQMD emission thresholds apply to all federally regulated air pollutants except for lead, which is not exceeded in the Los Angeles Basin. The ambient air standards regulated by the SCAQMD are established for the protection of sensitive receptors, which are facilities or structures that house or contain populations that are more susceptible to being adversely impacted due to compromised immune systems. This population includes the elderly, children, and persons with respiratory illnesses (including asthma or asthma-related problems) or impaired lung function.

Section 3.2, Air Quality, of the Draft EIR identified nearby long-term health care facilities, rehabilitation centers, and convalescent centers to be sensitive receptors. Exposure to potential emissions is variable and contingent upon outside factors, such as the amount of work being conducted, weather conditions, and the location and residence time of the receptors. SCS based their analysis on conservative estimates and worst-case conditions, using maximum levels of construction activity occurring simultaneously within a short period of time. SCS assumed that maximum potential on-site emissions are expected to occur during the potentially overlapping construction schedules for the MCH pediatric inpatient tower, utility trench, and central plant building; MCH pediatric outpatient building; and the parking facilities in the southwestern portion of the Campus. The closest proposed project element would be the construction of the MCH pediatric inpatient tower, which is estimated to be approximately 413 feet from the center of the main LBMMC building. The analysis revealed that the greatest potential for exposure of sensitive receptors to air contaminants would occur during the temporary construction phase, when potentially contaminated soil would be uncovered and equipment would be used for site grading, materials delivery, and building construction.

The potential exposure to patients was considered in the analysis prepared by SCS Engineers, who determined that potential exposures for patients at LBMMC are expected to be acute because many of the patients are outpatients. Inpatients were found to stay, on average, 4.9 days, which is the national average length of hospital stays in the United States based on statistics provided by the

[9] South Coast Air Quality Management District. 1993. *CEQA Air Quality Handbook*. Contact: 21865 Copley Drive, Diamond Bar, CA 91765.

Centers for Disease Control.[10] SCS Engineers determined that the potential exposures for both inpatients and outpatients are acute because the duration of stay is much less than would be expected for a long-term care facility. The impacts to off-site resident receptors, estimated at 5,500 feet from the MCH pediatric inpatient tower, are expected to be greatly dispersed because of the distance. Overall, impacts to sensitive receptors were determined to be less than significant due to rapid wind dispersion and dilution.

Air quality impacts for both the construction and operational phase of the proposed project were analyzed in the Draft EIR. Emission estimates included analysis of diesel and criteria air pollutant emissions from demolition, trucks, grading, building construction, vehicles and construction equipment, off-gassing of potentially contaminated soil and fugitive dust emissions during site excavation, and emissions from area sources, such as consumer products and landscaping equipment. Unmitigated construction emissions of carbon monoxide, nitrogen oxides, and reactive organic gases were determined to be significant. After implementation of mitigation measures, including methods to reduce fugitive dust emissions, reduce idling emissions from construction equipment, and implement construction management techniques to limit the amount of construction equipment operating simultaneously at the site, emissions will be minimized to the maximum extent feasible. Construction emissions of nitrogen oxides, however, will remain significant. Unmitigated operational emissions of nitrogen oxides were also determined to be significant. In order to reduce impacts from these emissions to below the level of significance, additional mitigation measures have been included in the EIR to address emissions from equipment operating at the proposed project site, vehicle emissions, and indirect emissions at the power plant source through implementation of energy efficiency measures.

The following operational mitigation measure is included in the EIR:

- Permits from SCAQMD shall be obtained for the proposed emergency generators. The issuance of permits for these generators by SCAQMD will require the operators of these facilities to implement best available control technology to minimize emissions of criteria air pollutants.

- All buildings shall meet the California Title 24 Energy Efficiency standards for water heating, space heating and cooling, and insulation.

- Energy efficient lighting will be installed in interiors of all buildings.

- Energy efficient parking lot lighting and exterior building lighting will be installed.

- Energy efficient appliances will be installed, where applicable.

- Shade trees will be planted near buildings and in parking lots to reduce summer cooling needs and reduce evaporative emissions from vehicles.

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[10] Centers for Disease Control, National Center for Health Statistics. 2002. *Hospital Utilization in Non-Federal Short Stay Hospitals.* Available at: http://www.cdc.gov/nchs/fastats/hospital.htm

- Design of the roadway realignment and parking projects will consider methods to reduce on-site vehicle queuing.

- On-site bicycle parking will be provided.

- Information on LBT services will be provided to employees at LBMMC and MCH.

- On-site eating and refrigeration services for employees will be provided to reduce lunch time trips.

Response to Comment No. 14:

It is the intent of the EIR to identify and focus on the significant environmental effects of all phases of the proposed project. The preparation of the Draft EIR extensively analyzed air quality issues, which included the potential health effects on the community. The City of Long Beach is aware that construction of a project of this magnitude will result in impacts to ambient air quality. Section 3.2, Air Quality, of the Draft EIR analyzed the impacts to air quality for the construction and operation of the proposed project and concluded that there were no significant anticipated impacts from operation of the proposed project. Thirteen mitigation measures, as specified in Section 3.2, Air Quality, would reduce the potential air quality impacts, with the exception of nitrogen oxides, to below the level of significance during the construction phase.

Section 3.9, Noise, of the Draft EIR discusses the Noise Analysis. This analysis was undertaken to identify opportunities to avoid, reduce, or otherwise mitigate potential significant impacts from noise and to identify potential alternatives. The analysis of noise includes a description of the regulatory framework that guides the decision-making process, existing conditions of the proposed project area, thresholds for determining if the proposed project would result in significant impacts, anticipated impacts (direct, indirect, and cumulative), mitigation measures, and level of significance after mitigation. The potential for impacts from noise has been analyzed in accordance with the methodologies provided by the County of Los Angeles Streamlined General Plan,[11] the Noise Control Ordinance of the County of Los Angeles,[12] and the site-specific acoustical analysis and modeling undertaken for the proposed project (Appendix I, *Noise Analysis*).[13] The Noise Analysis provided three mitigation measures that would reduce noise impacts to below the level of significance.

Any noise generated during the construction phase is short-term and expected to cease upon completion of construction. Permanent increase in the noise levels would occur from operations of the building and additional roadway noise. However, the long-term operational noise levels would be below the substantial increase level. Therefore, the operational impacts on ambient noise levels would be below the threshold for significance.

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[11] County of Los Angeles, Department of Regional Planning. 1993. *Streamlined County of Los Angeles General Plan.* Contact: 320 West Temple Street, Room 1348, Los Angeles, CA 90012.

[12] County of Los Angeles. 1978. Noise Control Ordinance of the County of Los Angeles. Ord. 1, 1778, § 2 (Art. 1, § 101) and Ord. 1, 1773, § 2 (Art. 1, § 101). Chapter 12.08. Available at: http://ordlink.com/codes/lacounty/index.htm

[13] VSA n Associates, Inc. 8 October 2004. *Long Beach Memorial Medical Center Expansion Noise Impact Analysis.* Contact: VSA n Associates, Inc., 12525 Lambert Road, Whittier, CA 90606.

Response to Comment No. 15:

Please see response to Comment No. 14.

Response to Comment No. 16:

Thank you for the comment concerning potential impacts of constructing and operating hospital expansion at the contaminated location. Section 3.5, Hazards and Hazardous Materials, of the Draft EIR acknowledges that the proposed project may result in environmental impacts related to hazards and hazardous materials. Therefore, this issue has been analyzed in detail in the EIR. This analysis was undertaken to identify opportunities to avoid, reduce, or otherwise mitigate potential significant impacts from hazards and hazardous materials and to identify potential alternatives. The HRA was developed by SCS Engineers according to DTSC and U.S. EPA risk assessment guidance. In addition, an independent third-party review was completed by Kleinfelder. LBMMC has entered in the VCA (see Appendix L) with DTSC to complete the site characterization study and HRA. LBMMC worked directly with DTSC to finalize the mitigation measures specified in the EIR to ensure their adequacy in remediating health risks to below the level of significance.

Response to Comment No. 17:

As indicated in Section 3.5, Hazards and Hazardous Materials, the proposed project is located in an area where soils containing petroleum hydrocarbons from oil field operations have been identified. The site has been found to be contaminated, primarily with metals and petroleum-related chemicals such as benzene, toluene, xylene, ethylbenzene, and petroleum hydrocarbons. The necessary first step in cleaning the site involves preparing a risk assessment, under DTSC guidance, to determine what the level of health risk associated with the site is and to determine the level of cleanup required. The risk assessment was included with the Draft EIR. Risk management will be conducted under DTSC guidance. The existence of abandoned and improperly abandoned oil wells, and the existence of petroleum hydrocarbon–contaminated soils, water, and buried construction debris have the potential to expose the public or the environment to risks related to potential release of hazards and hazardous materials. According to the California Department of Conservation Division of Oil, Gas and Geothermal Resources (DOGGR), all oil wells must be identified and properly abandoned prior to site redevelopment. Incorporation of appropriate mitigation measures (Hazards-1 through Hazards-15) during excavation of soils associated with the proposed project would be necessary to avoid hazards to the public or the environment.

Response to Comment No. 18:

Thank you for the comment representing interests in the history of remediation and monitoring of the site. The site is listed as a closed landfill and is under oversight by the Los Angeles County Department of Health Services (LACDHS). LACDHS conducts site inspections and monitoring for methane at manholes, pavement cracks, and so forth throughout the area. The specific reasons why the site has not been subject to a site cleanup to date are unknown. However, there is no indication of imminent health hazard existing at the site that would prompt an immediate cleanup. Methane membranes have been installed under the MCH entry and emergency entrance addition, and methane monitoring has been conducted at the site to evaluate gas concentrations.

Response to Comment No. 19:

Thank you for the comment concerning public disclosure regarding contaminated site. As stated in Section 1.0, Introduction, of the EIR, one of the purposes of CEQA is to disclose to the public the reasons for agency approvals of projects with significant environmental effects. The Notice of Preparation (NOP) concerning the EIR for the proposed project was circulated for a 30-day review period that began on August 23, 2004. The NOP was sent to the State Clearinghouse and distributed to various federal, state, regional, and local government agencies. A public Notice of Availability (NOA) of the NOP was provided in the *Press Telegram*. The NOP was sent to 48 private individuals and to the appropriate federal, state, and local regulatory agencies. The NOP was posted at the Long Beach Main Public Library, Burnett Public Library, and Dana Public Library. The Home Owners Association (HOA) meeting was held on November 1, 2004. The purpose of the meeting was to communicate and outreach to the Wrigley Neighborhood Association regarding the proposed project, and to hold a question and answer session in reply to their concerns. The meeting was attended by approximately 60 people. The Draft EIR was distributed to 33 federal, state, regional, and local government agencies and interested organizations and 197 individuals for a 45-day public review period. There were two Planning Commission study sessions held on December 2, 2005, and February 17, 2005. The Draft EIR was provided to the State Clearinghouse on January 20, 2005, for additional distribution to agencies. In addition, a public NOA of the Draft EIR appeared in the *Press Telegram* and was mailed directly to interested parties requesting the document. In addition, copies of this Draft EIR are published on the City of Long Beach Web site at http://www.longbeach.gov/plan/pb/epd/er.asp and are available during the public review period at several libraries. In addition, LBMMC entered into a VCA with DTSC to implemented additional California EPA requirements for public disclosure (more than 200 individuals received the Draft EIR). There is a Planning Commission meeting scheduled on May 5, 2005, and a City Counsel meeting scheduled in June 2005.

Response to Comment No. 20:

Thank you for the comment. Although the presentation of project alternatives is a significant part of the EIR process, a reduced project would not meet all of the project objectives to provide adequate health care services to the community. Therefore, changes to the construction phasing of the proposed project as discussed in the EIR would minimize significant impacts to air quality and traffic. These alternatives do consider alternative construction scenarios of the proposed project, which will have the potential to minimize effects on the environment.

Response to Comment No. 21:

Please see response to Comment No. 20.

Response to Comment No. 22:

The EIR contains two mitigation measures (Hazards-14 and Hazards-15) that require implementation of remedial action measures resulting form the VCA to be incorporated in conjunction with construction of the proposed project.

Response to Comment No. 23:

Thank you for the comment representing the interests in the VCA (see Appendix L). The VCA is refining the detailed and feasible mitigation measures that are included in Section 3.5, Hazards and Hazardous Materials. However, if the results from VCA studies differ from that of the EIR, new mitigation measures will be produced in agreement with DTSC and implemented prior to the construction of the proposed project.

Response to Comment No. 24:

Thank you for the comment. However, there is no requirement stated in CEQA to include cost estimates in the mitigation section of the Draft EIR. Feasible mitigation measures have been developed where possible to ensure safe and efficient traffic flow and to provide adequate parking.

Response to Comment No. 25:

Thank you for the comment and concern regarding the proposed project. The City of Long Beach Planning Commission will take the comments and concerns into consideration during the decision-making process. Although the implementation of the proposed project will result in significant impacts, a reduced, less intensive project would not meet all the project objectives to adequately serve the health care needs of the community.

Response to Comment No. 26:

Thank you for the comment regarding the traffic intersections that could not be feasibly mitigated. CEQA does require that the Draft EIR study mitigation measures to reduce potentially significant impacts, and the Draft EIR addresses potential mitigation measures where applicable. The three significant project traffic impacts in year 2008 and 2014 that Mr. Brohard suggests should be studied in further detail are the impacts to Atlantic Avenue and Willow Street, Long Beach Boulevard and Willow Street, and Long Beach Boulevard and Wardlow Road. The reason that the mitigation measures for these three intersections are significantly impacted and dismissed by the statement, "no physical mitigation measure is feasible," is based on a meeting with City staff. In this meeting, potential mitigation measures were discussed for the three intersections identified above. In all instances, the potential improvements required widening and the acquisition of additional right-of-way. The City staff felt that these mitigation measures were not feasible and that this impact will need to be documented in the Draft EIR as a "significant and unavoidable" project traffic impact.

Response to Comment No. 27:

Mr. Brohard found that, even with the parking accommodations listed in the Draft EIR, there would still be a shortage of 681 parking spaces. The Draft EIR states, "It would be feasible to address this shortfall through the development of a parking structure at the location of the existing surface Lot K." With a shortage of at least 681 parking spaces in year 2015, Mr. Brohard concludes that the Draft EIR should specifically require construction of a parking structure as a mitigation measure to address the parking structure. Based on the existing available resources, LBMMC defined a parking program to accommodate the parking demand resulting form construction and operation of elements of the proposed project (Table 3.11.4-7, *Construction Parking Program,* and Table 3.11.4-8, *Operation Parking Program*). The combined use of existing on-site parking, leasing immediately adjacent parking, and the development of additional on-site parking would provide sufficient parking to support construction and operation of three elements of the proposed project. However, these parking opportunities would still be insufficient by approximately 681 parking spaces to support the last four elements of the proposed project. If the lease of Parking Lots L and M could not be renewed in year 2015, there would be a need to replace the 534 parking spaces provided at that location, thus suggesting a total possible shortfall of 1,215 parking spaces in year 2015. It would be feasible to address this shortfall through the development of a parking structure at the location of the existing surface Parking Lot K. Development of Parking Lot K would displace 189 parking spaces during construction that would need to be incorporated into the design of the parking structure for a total capacity of 1,404. Thus, the inclusion of the parking program would provide a sufficient number of parking spaces that will be provided throughout the construction of the proposed project.

Response to Comment No. 28:

The parking program for the construction and operation impacts assume the construction of a parking structure by using portions of the capacity provided to meet the expanding parking needs of the Campus. Mr. Brohard states that the Draft EIR does not indicate when such a parking structure should be available for use. Development of the parking structure within Parking Lot K as an easterly expansion of the existing parking structure has been identified as a feasible location. It is expected that this parking structure would be an off-site structure with an approximate 1,404-vehicle capacity. The parking structure completion date is planned to be June 2011. These data are included in the Draft EIR, Table 3.11.4-5, *Additional Parking Spaces Required During Construction*, and Table 4.2.7-1, *Alternative Construction Parking Program*.

Response to Comment No. 29:

Thank you for the comment. Public involvement is an essential feature of CEQA. The environmental review process introduced by CEQA has greatly expanded the opportunities for interested citizens to participate in project planning and the government decision-making process. This EIR is intended to be a tool by which the public can gain access to information and influence the outcome of the proposed project.

Response to Comment No. 30:

Thank you for the comment. The inconsistencies in the Draft EIR regarding construction completion dates and building areas have been addressed. The correct values are listed in Table 2.4.1-1, Master Plan Anticipated Projects. These inconsistencies are considered minor and do not warrant recirculation of the Draft EIR for public review. The analytical methods utilized in the traffic study conducted by LLG are considered to be adequate according to City of Long Beach requirements and industry standards.

13.2.7 Individuals

Steve Askin
1700 East Ocean Boulevard, Apartment 32
Long Beach, California 90802

Elizabeth Campbell
4803 Lorelei Avenue
Long Beach, California 90808

Gloria L. Manlutac
2403 Adriatic Avenue
Long Beach, California 90810

Liz Moore
100 Cerritos Avenue, Apartment 5
Long Beach, California 90802

Milagros A. Reguindin
2745 Wetherly Avenue
Long Beach, California 90810

Rommel Porciuncula
2785 Chestnut Avenue
Long Beach, California 90806

Ellen Stutzman
219 Redondo Avenue, Apartment A
Long Beach, California 90803

Erlinda Uy
3151 Harding Street
Long Beach, California 90805

Victoria Williams
1405 East 10th Street
Long Beach, California 90813

Cara Zarnell
355 Freeman Avenue, Apartment 8
Long Beach, California 90814

Steve Askin
<ska2@columbia.edu>
03/10/2005 02:19 PM

To: anita_garcia@longbeach.gov
cc:
Subject: COMMENT SUBMISSION ON LONG BEACH MEMORIAL MEDICAL CENTER PROJECT

1700 E. Ocean Blvd
Apartment 32
Long Beach, CA 90802
Email ska2@columbia.edu
March 10, 2005

RECEIVED
MAR 1 0 2005
Planning and Building Dept.
Community Planning

City of Long Beach
Attention: Ms. Anita Garcia
BY FAX TO 562-570-6610
Dept of Planning and Building
City Hall, Fifth Floor
333 West Ocean Blvd
Long Beach, CA 90802

Dear Ms. Garcia,

I am a Long Beach resident writing to voice concern about the environmental and public health dangers which may be posed by the Long Beach Memorial Medical Center expansion project.

Just last week, a friend of mine received a letter from the Department of Toxic Substances Control. The letter mentioned a possible cleanup that may be required to remove "petroleum-related compounds" from the site. I took a look at the draft Environmental Impact Report at Dana Public Library and read that there may be toxic substances, and potentially explosive methane gases, in the soil of the proposed construction site.

As the father of a small child, I know that the best place to take my son if he has an urgent medical problem is the children's hospital next door to Memorial. Based on what I could understand in this complicated report, I'd be nervous about taking him to the hospital while the construction is under way.

I must admit, I didn't have time to read or fully understand what seemed to be at least 1,000 pages of highly technical documents at the library. I'd urge the City of Long Beach to schedule a series of public hearings at times when most people can attend, such as evenings and weekends. I'd also urge the City to extend the public review period to give concerned residents an opportunity to comment after having our questions answered by knowledgeable hospital and City officials, and especially by environmental experts who are independent of the hospital. I understand that the public review period is currently scheduled to end today. I doubt that most Long Beach residents even know that this project is being planned.

Could you please keep me informed of further action on this project, and of any public hearings and public comment opportunities.

Sincerely,

Steve Askin

Steve Askin
1700 East Ocean Boulevard, Apartment 32
Long Beach, California 90802

Response to Comment No. 1:

Thank you for the comment concerning potential environmental and public health dangers posed by the proposed project. Methane membranes have been installed under the MCH entry and emergency entrance addition, and methane monitoring has been conducted at the site to evaluate gas concentrations. Methane mitigation will be included during construction of the proposed project.

Response to Comment No. 2:

As indicated in Section 3.5, Hazards and Hazardous Materials, the proposed project may result in environmental impacts related to hazards and hazardous materials. The site has been found to be contaminated, primarily with metals and petroleum-related chemicals such as benzene, toluene, xylene, ethylbenzene, and petroleum hydrocarbons. Detailed mitigation measures are included in Section 3.5, Hazards and Hazardous Materials. Mitigation measures include installation of vapor barriers (i.e., high-density polyethylene membrane liners) and passive venting systems in the foundations of the MCH pediatric inpatient tower and central plant building, if determined to be required by the HRA to mitigate potential accumulation of methane, hydrogen sulfide, or other petroleum-related gases into underground areas (i.e., basements) or inside buildings. In addition, petroleum hydrocarbon–contaminated soils and water will be tested, treated, and disposed of as necessary under the oversight of the DTSC. The VCA is refining the EIR's feasible mitigation measures.

Response to Comment No. 3:

To avoid impacts on the public and construction workers during construction period, the construction work plan identifies safe passage to and from the hospital during project construction. In addition, all appropriate health and safety measures will be implemented during project construction to verify that dangerous levels of methane or other contaminants are not released. The construction work plan will be updated by the construction contractor prior to initiation of construction activities.

Response to Comment No. 4:

Thank you for the comment concerning public disclosure regarding contaminated site. As stated in Section 1.0, Introduction, of the Draft EIR, one of the purposes of CEQA is to disclose to the public the reasons for agency approvals of projects with significant environmental effects. The NOP concerning the EIR for the proposed project was circulated for a 30-day review period that began on August 23, 2004. The NOP was sent to the State Clearinghouse and distributed to various federal, state, regional, and local government agencies. A public NOA of the NOP was provided in the *Press Telegram*. The NOP was sent to 48 private individuals and to the appropriate federal, state, and local regulatory agencies. The NOP was posted at the Long Beach Main Public Library, Burnett Public Library, and Dana Public Library. The public scoping meeting was held on Wednesday, September 8, 2004 at 6:00 p.m. in the Houssels Forum, Long Beach, California. A presentation of the proposed project was made at the November 1, 2004, Wrigley Neighborhood Association meeting. Also in attendance were members from Memorial Heights Homeowner

Association, Sunrise Boulevard Historic District Neighborhood, and West Long Beach Neighborhood Association. The purpose of the meeting was to communicate and outreach to the residential community regarding the proposed project, and to hold a question and answer session in reply to their concerns. The meeting was attended by approximately 60 people. The Draft EIR was distributed to 33 federal, state, regional, and local government agencies and interested organizations and 197 individuals for a 45-day public review period. There were two Planning Commission study sessions held on December 2, 2005, and February 17, 2005. The Draft EIR was provided to the State Clearinghouse on January 20, 2005, for additional distribution to agencies. In addition, a public NOA of the Draft EIR appeared in the *Press Telegram* and was mailed directly to interested parties requesting the document. In addition, copies of this Draft EIR are published on the City of Long Beach Web site at http://www.longbeach.gov/plan/pb/epd/er.asp and are available during the public review period at several libraries. In addition, LBMMC entered into a VCA with DTSC to implemented additional California EPA requirements for public disclosure (more than 200 individuals received the Draft EIR). There is a Planning Commission meeting scheduled on May 5, 2005, and a City Counsel meeting scheduled in June 2005.

Response to Comment No. 5:

Dear Mr. Askin, your name will be added to our distribution list.

RECEIVED
MAR 1 0 2005
Planning and Building Dep.
Community Planning

March 9, 2005

City of Long Beach
Dept of Planning and Building
Attention: Ms. Anita Garcia
City Hall, Fifth Floor
Long Beach, CA 90802

Dear Ms. Garcia, Project Manager,

I am a concerned citizen of Long Beach. I heard about the Long Beach Memorial expansion project and wanted to write to express my concerns around the draft environmental impact report.

While I support more medical services in our community and am very proud of the quality of care given by our community hospitals, I believe that the level of impact on the surrounding neighborhoods needs to be appropriately addressed and mitigated. I believe that the draft EIR does not adequately tackle the affordable housing issues in this neighborhood. Nor does the report show how the increased traffic to the area will be answered.

I strongly urge the planning commission to evaluate the report thoroughly, so that our neighborhoods do not suffer from a lack of planning.

Sincerely,

Elizabeth Campbell

Elizabeth Campbell
4803 Lorelei Ave
Long Beach, CA 90808

Elizabeth Campbell
4803 Lorelei Avenue
Long Beach, California 90808

Response to Comment No. 1:

Thank you for the comments and concerns regarding the proposed project. The City of Long Beach Planning Commission will take the comments and concerns into consideration during the decision-making process.

Response to Comment No. 2:

Thank you for the comments and concerns regarding the proposed project. The City of Long Beach Planning Commission will take the comments and concerns into consideration during the decision-making process. The Long Beach Housing Action Plan (HAP) serves as the framework for the allocation of the City's scarce affordable housing resources (redevelopment housing set-aside and HOME funds) according to the income (very low, low, moderate) and tenure (owner/renter) of the target population. The HAP aims to maximize investment toward providing quality, affordable housing to as many Long Beach residents as possible, with a clear and pronounced effect in revitalizing and stabilizing Long Beach neighborhoods. In its initial implementation, the HAP will focus efforts in three specific neighborhoods in the City to strengthen and make a difference in those neighborhoods. Over the period 1990–1999, the City of Long Beach added 2,524 new housing units to the City's housing stock. In addition, the City has identified three sites within the vicinity of the proposed project that are to be developed for future residential units—providing an estimated 231 new residential units at Long Beach Boulevard, Del Amo Boulevard, and 31st Street.

The process by which the City assists displaced tenants is as follows: The 51 existing housing units within the 13 structures intended to be demolished must be cleared through the City's Department of Community Development, Housing Services Bureau. The process may not be applicable if the units are vacant. In order for the City to assist the displaced tenants, existing tenant would need to fill out a "Tenant Relocation Program Application" to see if any benefits would be applicable. This process would be required prior to the issuance of any demolition permit.

Section 3.11, Traffic and Transportation, of the Draft EIR and Appendix J of the Draft EIR evaluate the potential traffic and parking impacts associated with the proposed project. Section 3.11.6, Mitigation Measures, of the Draft EIR identifies recommended mitigation measures to reduce significant project traffic impacts and parking impacts, including parking impacts related to the construction and operation for each element of the proposed project.

Response to Comment No. 3:

The City of Long Beach Planning Commission will take the comments and concerns into consideration during the decision-making process.

RECEIVED
MAR 1 0 2005
Planning and Building Dept.
Community Planning

City of Long Beach
Attn: Ms. Anita Garcia
Dept of Planning and Building
City Hall, Fifth Floor
333 West Ocean Blvd
Long Beach, CA 90802

Dear Ms. Anita Garcia,

I am a proud resident of Long Beach. Our city has been able to maintain a great quality of life while continuing to grow. It is because of our quality of life that I am writing to express concern over the proposed expansion of Long Beach Memorial and the inadequacies of the Draft EIR.

While fights over the expansion of the 710 freeway continue around quality of life issues, it's the same for our neighborhoods. When I'm talking with my neighbors, the problem that comes up all of the time is car-related, from traffic to parking.

The Draft EIR does not adequately mention how these issues will be resolved.

I ask the planning commission to properly address traffic and parking concerns in this neighborhood.

Thank you

Gloria L. Mantuba
2403 Adriatic Ave
Long Beach Ca. 90810

Gloria L. Manlutac
2403 Adriatic Avenue
Long Beach, California 90810

Response to Comment No. 1:

Thank you for the comments and concerns regarding the proposed project. The City of Long Beach Planning Commission will take the comments and concerns into consideration during the decision-making process.

Response to Comment No. 2:

The Traffic Impact Analysis (see Appendix J) prepared by LLG provides detailed information on the impacted intersections surrounding the proposed project site. Twenty-six key intersections were analyzed for potential impacts in the project vicinity, and 11 key intersections were found to be impacted as a result of the proposed project. Freeway 710 does provide access to most of the key intersections. Although Freeway 710 is not in the immediate project vicinity, the related impacts are accounted for in the Traffic Impact Analysis. Section 3.11, Traffic and Transportation, of the Draft EIR and Appendix J of the Draft EIR evaluate the potential traffic and parking impacts associated with the proposed project. Section 3.11.6, Mitigation Measures, of the Draft EIR identifies recommended mitigation measures to reduce significant project traffic impacts and parking impacts. For example, specific project improvements and mitigation measures are provided for as part of the project description and to mitigate traffic- and parking-related impacts to below the level of significance. The proposed project can be expected to contribute a proportional fair share of the improvement costs for the impacted intersections to mitigate the project's traffic impacts.

Response to Comment No. 3:

This EIR will properly address project-related traffic and parking concerns. Section 3.11, Traffic and Transportation, of the Draft EIR and Appendix J of the Draft EIR evaluate the potential traffic and parking impacts associated with the proposed project. Section 3.11.6, Mitigation Measures, of the Draft EIR identifies recommended mitigation measures to reduce significant project traffic impacts and parking impacts. Furthermore, these concerns will be reviewed by the City of Long Beach Planning Commission.

March 10, 2005

City of Lo ıg Beach
Attention: Ms. Anita Garcia
Dept of Pl ınning and Building

Fax: 562- ;70-6610

RECEIVED
MAR 1 0 2005
Planning and Building Dep
Community Planning

Dear Ms. Garcia,

Please acc :pt my comments to the Draft Environmental Impact Report prepared for the proposed expansion of Long Beach Memorial Medical Center. Traffic and the resulting air pollution already threaten the quality of life in Long Beach, and I understand that the hospital expansion may add thousands of additional car and truck trips to our already crowded streets, and considerably worsen conditions at some of our already grid-locked intersections. If the hospital is going to expand, it must take responsibility for the impacts it creates and find ways to improve traffic flow. The hospital has a responsibility to improve the health of our community as well as its patients. It can do this by committing to fund substantial improvements to area transit and road infrastructure. Please address these concerns, which are shared by many residents.

Thank you for your attention to these matters.

Sincerely,

Liz Moore
100 Cerritos Ave., #5
Long Beach, CA 90802

Liz Moore
100 Cerritos Avenue, #5
Long Beach, California 90802

Response to Comment No. 1:

Thank you for the comments in response to the Draft EIR. Section 3.11, Traffic and Transportation, of the Draft EIR and Appendix J of the Draft EIR evaluate the potential traffic and parking impacts associated with the proposed project. As indicated in Table 3.11.4-2 on page 3.11-14 of the Draft EIR, the proposed project, at build-out, is forecast to generate 9,377 daily trips, with 696 trips produced in the a.m. peak hour and 979 trips produced in the p.m. peak hour on a typical weekday. The potential traffic impacts at key area intersections associated with the proposed project is summarized in Section 3.11.5, Cumulative Impacts, of the Draft EIR and Section 8.0 of Appendix J of the Draft EIR. Section 3.11.6, Mitigation Measures, of the Draft EIR identifies recommended mitigation measures to reduce significant project traffic impacts and parking impacts. The proposed project can be expected to contribute a fair share of the construction costs to implement recommended mitigation measures at key impacted intersections.

City of Lo g Beach
Attention: Ms. Anita Garcia
Dept of Pl nning and Building
City Hall, Fifth Floor
333 West Ocean Blvd
Long Beac , CA 90802

RECEIVED
MAR 1 0 2005
Planning and Building Dep
Community Planning

Dear Ms. Garcia,

I have seve al comments on the Draft EIR for the Long Beach Memorial Hospital expansion. While mor hospital care of our communities is always important, because of the scope of the project, I a particularly concerned about the potential impact on delivery of care as well as the lack of cor munity input in to the process.

I have hear that the impact of increased traffic may reach thousands of additional trips per day. Have the a propriate transportation infrastructures been put in place for this neighborhood so that we can still get to the hospitals in a timely manner? I believe that the Draft EIR does not answer this questio .

Due to the ize of this project and the length of the Draft EIR, there has not been scant opportunity for thorough review and public comment. I urge the planning commission to increase the time av ilable for public comment, so that our residents can be involved in decisions that impact the ommunity.

Thank you.

Milagros A. Reguindin
2745 Wetherly Ave.
Long Beach Ca. 90810

Milagros A. Reguindin
2745 Wetherly Avenue
Long Beach, California 90810

Response to Comment No. 1:

Thank you for the comments and concerns regarding the proposed project. The City of Long Beach Planning Commission will take the comments and concerns into consideration during the decision-making process.

Response to Comment No. 2:

Thank you for the comments in response to the Draft EIR. Section 3.11, Traffic and Transportation, of the Draft EIR and Appendix J of the Draft EIR evaluate the potential traffic and parking impacts associated with the proposed project. As indicated in Table 3.11.4-2 on page 3.11-14 of the Draft EIR, the proposed project, at build-out, is forecast to generate 9,377 daily trips, with 696 trips produced in the a.m. peak hour and 979 trips produced in the p.m. peak hour on a typical weekday. The potential traffic impacts at key area intersections associated with the proposed project is summarized in Section 3.11.5, Cumulative Impacts, of the Draft EIR and Section 8.0 of Appendix J of the Draft EIR. Section 3.11.6, Mitigation Measures, of the Draft EIR identifies recommended mitigation measures to reduce significant project traffic impacts and parking impacts. The proposed project can be expected to contribute a fair share of the construction costs to implement recommended mitigation measures at key impacted intersections.

Response to Comment No. 3:

Thank you for the comment concerning public disclosure regarding contaminated site. As stated in Section 1.0, Introduction, of the Draft EIR, one of the purposes of CEQA is to disclose to the public the reasons for agency approvals of projects with significant environmental effects. The NOP concerning the EIR for the proposed project was circulated for a 30-day review period that began on August 23, 2004. The NOP was sent to the State Clearinghouse and distributed to various federal, state, regional, and local government agencies. A public NOA of the NOP was provided in the *Press Telegram*. The NOP was sent to 48 private individuals and to the appropriate federal, state, and local regulatory agencies. The NOP was posted at the Long Beach Main Public Library, Burnett Public Library, and Dana Public Library. The HOA meeting was held on November 1, 2004. The purpose of the meeting was to communicate and outreach to the Wrigley Neighborhood Association regarding the proposed project, and to hold a question and answer session in reply to their concerns. The meeting was attended by approximately 60 people. The Draft EIR was distributed to 33 federal, state, regional, and local government agencies and interested organizations and 197 individuals for a 45-day public review period. There were two Planning Commission study sessions held on December 2, 2005, and February 17, 2005. The Draft EIR was provided to the State Clearinghouse on January 20, 2005, for additional distribution to agencies. In addition, a public NOA of the Draft EIR appeared in the *Press Telegram* and was mailed directly to interested parties requesting the document. In addition, copies of this Draft EIR are published on the City of Long Beach Web site at http://www.longbeach.gov/plan/pb/epd/er.asp and are available during the public review period at several libraries. In addition, LBMMC entered into a VCA with DTSC to implemented additional California EPA requirements for public disclosure (more than 200 individuals received the Draft EIR). There is a Planning Commission meeting scheduled on May 5, 2005, and a City Counsel meeting scheduled in June 2005.

RECEIVED
MAR 1 0 2005
Planning and Building Dept.
Community Planning

Ms. Anita Garcia
Dept of Planning and Building
333 West Ocean Blvd
Long Beach, CA 90802

Dear Ms. Garcia,

Long Beach Memorial is proposing to expand medical facilities at the current site at 2801 Atlantic Avenue in Long Beach. As I understand, the expansion would eliminate many apartments and housing for current residents in that neighborhood.

The Bixby Knolls neighborhood is clearly an area that is in the process of changing. I think that these changes need to reflect the history of the neighborhood by preserving housing affordability in the area.

The EIR does not appear to evaluate nor mitigate the issues around housing for these residents.

I hope the planning commission will seriously take the lives of our city's residents in to consideration, and find a way to provide affordable housing for these displaced residents.

Sincerely,

2785 CHESTNUT AVE
LONG BEACH, CA 90806

Rommel Porciuncula
2785 Chestnut Avenue
Long Beach, California 90806

Response to Comment No. 1:

There are currently 13 residential structures on the site, including 6 single-family dwellings and 7 multiunit dwellings; all of these structures are occupied by renters. These structures would be demolished and converted to parking uses to support the proposed project. According to the City of Long Beach Municipal Code, one third of the property is zone as General Institutional, which permits hospitals, medical centers, and uses of public nature. The proposed parking areas would be located within the portion of the Campus that is zoned as a Regional Highway (CHW) District and a Community Automobile-Oriented (CCA) District. The CCA District permits retail and service uses for an entire community, including convenience and shopping goods and associated services. The proposed project for the Campus parking, are consistent with these zoning uses. The LBMMC acquired these properties to accommodate the expansion. Without the acquisition of these properties, the Campus would not be able to expand and thus not be able to provide medical services to the community. Because the property is owned by the LBMMC and is not located within the California Coastal Commission Coastal Zone, no relocation assistance or replacement of the units is required.

Response to Comment No. 2:

The Long Beach HAP serves as the framework for the allocation of the City's scarce affordable housing resources (redevelopment housing set-aside and HOME funds) according to the income (very low, low, moderate) and tenure (owner/renter) of the target population. The HAP aims to maximize investment toward providing quality affordable housing to as many Long Beach residents as possible with a clear and pronounced effect in revitalizing and stabilizing Long Beach neighborhoods. In its initial implementation, the HAP will focus efforts in three specific neighborhoods in the City to strengthen and make a difference in those neighborhoods. Over the period 1990–1999, the City of Long Beach added 2,524 new housing units to the City's housing stock. In addition, the City has identified three sites within the vicinity of the proposed project that are to be developed for future residential units—providing an estimated 231 new residential units at Long Beach Boulevard, Del Amo Boulevard, and 31st Street.

Response to Comment No. 3:

Mitigation measures are not required for the loss of the 13 residential structures as the properties are owned by the LBMMC. In addition, the proposed parking structure is consistent with the Long Beach Municipal Code land uses.

Response to Comment No. 4:

The process by which the City assists displaced tenants is as follows: The 51 existing housing units within the 13 structures intended to be demolished must be cleared through the City's Department of Community Development, Housing Services Bureau. The process may not be applicable if the units are vacant. In order for the City to assist the displaced tenants, existing tenant would need to fill out a "Tenant Relocation Program Application" to see if any benefits would be applicable. This process would be required prior to the issuance of any demolition permit.

March 10, 2005

City of Long Beach
Attention: Ms. Anita Garcia
Dept of Planning and Building
City Hall, Fifth Floor
333 West Ocean Blvd
Long Beach, CA 90802

RECEIVED
MAR 1 0 2005
Planning and Building Dept.
Community Planning

Fax: 562-570-6610

Re: Long Beach Memorial Medical Center Draft Environmental Impact Report (DEIR)

Dear Ms. Garcia:

I am writing to express my deep concerns around the proposed expansion of Long Beach Memorial Medical Center and Miller Children's Hospital.

Since becoming aware of the DEIR for this project in early February, I have made great efforts to review the hundreds of pages of the DEIR and appended technical studies to understand what this expansion will mean for our communities. I was concerned to read this project will take place on a former landfill and within abandoned oil fields, and that the construction project will excavate toxic and carcinogenic chemicals that have accumulated in the soil. I was shocked when I received a letter from the Department of Toxic Substances Control of the Cal/EPA informing me of the Department's role to "protect human health and the environment by overseeing the investigation and any cleanup required". I can only assume the Department's involvement stems from real threats to both human health and the environment.

It is only reasonable for the City of Long Beach to address the concerns its residents have regarding this enormous and potentially dangerous project, by extending the public review period and holding a new public hearing where the environmental impacts of this project -- and the steps being taken to protect our communities and our environment -- are discussed. This hearing should be held during evening hours, to allow residents the opportunity to attend. I understand public comments were accepted at the last Planning Commission meeting, although this meeting was held in the middle of the day when most people, including myself, are at work.

Sincerely,

Ellen Stutzman

Ellen Stutzman
219 Redondo Ave, A
Long Beach, CA 90803
949-232-2?44
ellenstutzman@hotmail.com

Ellen Stutzman
219 Redondo Avenue, Apartment A
Long Beach, California 90803

Response to Comment No. 1:

Thank you for the comments and concerns regarding the proposed project. The City of Long Beach Planning Commission will take the comments and concerns into consideration during the decision-making process.

Response to Comment No. 2:

Thank you for the comment concerning potential impacts of constructing and operating hospital expansion at the contaminated location. Section 3.5, Hazards and Hazardous Materials, of the Draft EIR acknowledges that the proposed project may result in environmental impacts related to hazards and hazardous materials. Therefore, this issue has been analyzed in detail in the EIR. This analysis was undertaken to identify opportunities to avoid, reduce, or otherwise mitigate potential significant impacts from hazards and hazardous materials and to identify potential alternatives. The HRA was developed by SCS Engineers according to DTSC and U.S. EPA risk assessment guidance. In addition, an independent third-party review was completed by Kleinfelder Associates. LBMMC has entered in the VCA (see Appendix L) with DTSC to complete the site characterization study and HRA. LBMMC worked directly with DTSC to finalize the mitigation measures specified in the EIR to ensure their adequacy in remediating health risks to below the level of significance.

Response to Comment No. 3:

The City of Long Beach understands the concerns and has addressed them in Volume III of the Final EIR for the Long Beach Memorial Medical Center Expansion. Volume III is the result of public review of the Draft EIR and several public hearings held by the City of Long Beach. The City of Long Beach notified the public of the opportunity to comment on the Draft EIR via a notice in a local newspaper, a notice at the project site, and mailings to owners and occupants of contiguous parcels. The comments and concerns will be taken into account by the Planning Commission during the decision-making process.

Thank you for the comment concerning public disclosure regarding contaminated site. As stated in Section 1.0, Introduction, of the Draft EIR, one of the purposes of CEQA is to disclose to the public the reasons for agency approvals of projects with significant environmental effects. The NOP concerning the EIR for the proposed project was circulated for a 30-day review period that began on August 23, 2004. The NOP was sent to the State Clearinghouse and distributed to various federal, state, regional, and local government agencies. A public NOA of the NOP was provided in the *Press Telegram*. The NOP was sent to 48 private individuals and to the appropriate federal, state, and local regulatory agencies. The NOP was posted at the Long Beach Main Public Library, Burnett Public Library, and Dana Public Library. The public scoping meeting was held on Wednesday, September 8, 2004 at 6:00 p.m. in the Houssels Forum, Long Beach, California. A presentation of the proposed project was made at the November 1, 2004, Wrigley Neighborhood Association meeting. Also in attendance were members from Memorial Heights Homeowner Association, Sunrise Boulevard Historic District Neighborhood, and West Long Beach Neighborhood Association. The purpose of the meeting was to communicate and outreach to the residential community regarding the proposed project, and to hold a question and answer session in reply to their concerns. The meeting was attended by approximately 60 people. The Draft EIR was distributed to 33 federal, state, regional, and local government agencies and interested organizations and 197 individuals for a 45-day public review period. There were two Planning Commission study sessions held on December 2, 2005, and February 17, 2005. The Draft EIR was provided to the State Clearinghouse on January 20, 2005, for additional distribution to agencies. In addition, a public NOA of the Draft EIR appeared in the *Press Telegram* and was mailed directly to interested parties requesting the document. In addition, copies of this Draft EIR are published on the City of Long Beach Web site at http://www.longbeach.gov/plan/pb/epd/er.asp and are available during the public review period at several libraries. In addition, LBMMC entered into a VCA with DTSC to implemented additional California EPA requirements for public disclosure (more than 200 individuals received the Draft EIR). There is a Planning Commission meeting scheduled on May 5, 2005, and a City Counsel meeting scheduled in June 2005.

City of Lo ng Beach
Attn: Ms. Anita Garcia
Dept of P anning and Building
City Hall, Fifth Floor
333 West Ocean Blvd
Long Bea ch, CA 90802

RECEIVED
MAR 1 0 2005
Planning and Building Dept
Community Planning

Re: Long Beach Memorial Expansion

To: Ms. A nita Garcia,

I have a read a copy of the Draft EIR for Long Beach Memorial and Miller Children's Hospital. I am writing because the report does not adequately mitigate the concerns raised abo ut air quality, specifically with increased traffic flow to the area.

While the air quality in Long Beach is already horrible, the impacts from the construction activity, the increased traffic, and the operation of new air pollution sources from the building would be tremendous. These impacts have not been addressed in a way that would preserve the health of our community.

The planning commission should thoroughly review the draft EIR documents to protect the safety of our neighborhoods.

Sincerely,

ERLINDA OY
3151 HARDING ST
LB CA 90805

Erlinda Uy
3151 Harding Street
Long Beach, California 90805

Response to Comment No. 1:

Thank you for the comment. In response to the concerns over the adequacy of the air quality analysis related to the proposed project, the EIR hopes to address the comments and concerns and defend the general approach and technical qualifications used in the air quality impact analysis. Section 3.2, Air Quality, of the Draft EIR was evaluated in accordance with the methodologies and information provided by Appendix G of the State CEQA Guidelines, the SCAQMD,[14] and the Air Quality Technical Report prepared by SCS Engineers (Appendix C, *Air Quality Technical Report*).

As stated in the statement of objectives for the proposed project, one of the goals of the proposed project is to improve the health and well-being of the community. It is the intent of the EIR to identify and focus on the significant environmental effects of all phases of the proposed project. The preparation of the Draft EIR extensively analyzed air quality in relation to traffic issues and evaluated the potential health effects the proposed project may have on the community.

Air quality impacts for both the construction and operational phase of the proposed project were analyzed in the Draft EIR. Emission estimates included analysis of diesel and criteria air pollutant emissions from demolition, trucks, grading, building construction, vehicles and construction equipment, off-gassing of potentially contaminated soil and fugitive dust emissions during site excavation, and emissions from area sources, such as consumer products and landscaping equipment. Unmitigated construction emissions of carbon monoxide, nitrogen oxides, and reactive organic gases were determined to be significant. After implementation of mitigation measures, including methods to reduce fugitive dust emissions, reduce idling emissions from construction equipment, and implement construction management techniques to limit the amount of construction equipment operating simultaneously at the site, emissions will be minimized to the maximum extent feasible. Construction emissions of nitrogen oxides, however, will remain significant. Unmitigated operational emissions of nitrogen oxides were also determined to be significant. In order to reduce impacts from these emissions to below the level of significance, additional mitigation measures have been included in the EIR to address emissions from equipment operating at the proposed project site, vehicle emissions, and indirect emissions at the power plant source through implementation of energy efficiency measures.

The following operational mitigation measure is included in the EIR:

- Permits from SCAQMD shall be obtained for the proposed emergency generators. The issuance of permits for these generators by SCAQMD will require the operators of these facilities to implement best available control technology to minimize emissions of criteria air pollutants.

- All buildings shall meet the California Title 24 Energy Efficiency standards for water heating, space heating and cooling, and insulation.

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[14] South Coast Air Quality Management District. 1993. *CEQA Air Quality Handbook*. Contact: 21865 Copley Drive, Diamond Bar, CA 91765.

- Energy efficient lighting will be installed in interiors of all buildings.
- Energy efficient parking lot lighting and exterior building lighting will be installed.
- Energy efficient appliances will be installed, where applicable.
- Shade trees will be planted near buildings and in parking lots to reduce summer cooling needs and reduce evaporative emissions from vehicles.
- Design of the roadway realignment and parking projects will consider methods to reduce on-site vehicle queuing.
- On-site bicycle parking will be provided.
- Information on LBT services will be provided to employees at LBMMC and MCH.
- On-site eating and refrigeration services for employees will be provided to reduce lunch time trips.

Response to Comment No. 2:

Thank you for the comments and concerns regarding the proposed project. The City of Long Beach Planning Commission will take the comments and concerns into consideration during the decision-making process. Section 3.11, Traffic and Transportation, of the Draft EIR and Appendix J of the Draft EIR evaluate the potential traffic and parking impacts associated with the proposed project. Section 3.11.6, Mitigation Measures, of the Draft EIR identifies recommended mitigation measures to reduce significant project traffic impacts and parking impacts, including parking impacts related to the construction and operation for each element of the proposed project.

RECEIVED
MAR 10 2005
Planning and Building Dept.
Community Planning

City of Long Beach
Attn: Ms. Anita Garcia, Project Manager
Department of Planning and Building
City Hall, Fifth Floor
333 West Ocean Blvd
Long Beach, CA 90802

Dear Planning Commissioner,

I am writing in response to the environmental impact report around the Long Beach Memorial expansion project.

Long Beach Memorial and Miller Children's Hospital are integral parts of our community. I am proud of the outstanding work that both hospitals provide for the residents in this neighborhood and for many children in Southern California. I personally have been a patient at Long Beach Memorial and received excellent care for a [illegible]

I am deeply alarmed that the proposed expansion of these two hospitals are said to be on top of an old oil field. What kind of care will these hospitals be able to provide care to me and my family if it's built on a toxic site?

I urge the planning commission to treat this expansion very seriously by inviting the public to participate in a town hall hearing with the hospital owners.

Sincerely, Victoria Williams
1405 E. 10TH ST.

Victoria Williams
1405 East 10th Street
Long Beach, California 90813

Response to Comment No. 1:

Thank you for the comments and concerns regarding the proposed project. The City of Long Beach Planning Commission will take the comments and concerns into consideration during the decision-making process.

Response to Comment No. 2:

The LBMMC and MCH are dedicated to providing exceptional health care services to the Long Beach community. The City appreciates the feedback on the quality of care at LBMMC and will take the comments and concerns into consideration during the decision-making process.

Response to Comment No. 3:

As indicated in Section 3.5, Hazards and Hazardous Materials, of the Draft EIR, the proposed project is located in an area where soils containing petroleum hydrocarbons from oil field operations have been identified. The existence of abandoned and improperly abandoned oil wells, and the existence of petroleum hydrocarbon–contaminated soils, water, and buried construction debris have the potential to expose the public or the environment to risks related to potential release of hazards and hazardous materials. Site investigation, risk assessment, and site cleanup are being conducted under the guidance of the DTSC. According to DOGGR, all oil wells must be identified and properly abandoned prior to site redevelopment. Incorporation of appropriate mitigation measures (Hazards-1 through Hazards-15) during excavation of soils associated with the proposed project would be necessary to avoid hazards to the public or the environment. Contamination at the proposed project site will be remediated to a level that is determined to be safe for occupants of the proposed project.

Response to Comment No. 4:

Thank you for the comment concerning public disclosure regarding contaminated site. As stated in Section 1.0, Introduction, of the Draft EIR, one of the purposes of CEQA is to disclose to the public the reasons for agency approvals of projects with significant environmental effects. The NOP concerning the EIR for the proposed project was circulated for a 30-day review period that began on August 23, 2004. The NOP was sent to the State Clearinghouse and distributed to various federal, state, regional, and local government agencies. A public NOA of the NOP was provided in the *Press Telegram*. The NOP was sent to 48 private individuals and to the appropriate federal, state, and local regulatory agencies. The NOP was posted at the Long Beach Main Public Library, Burnett Public Library, and Dana Public Library. The public scoping meeting was held on Wednesday, September 8, 2004 at 6:00 p.m. in the Houssels Forum, Long Beach, California. A presentation of the proposed project was made at the November 1, 2004, Wrigley Neighborhood Association meeting. Also in attendance were members from Memorial Heights Homeowner Association, Sunrise Boulevard Historic District Neighborhood, and West Long Beach Neighborhood Association. The purpose of the meeting was to communicate and outreach to the residential community regarding the proposed project, and to hold a question and answer session in reply to their concerns. The meeting was attended by approximately 60 people. The Draft EIR was distributed to 33 federal, state, regional, and local government agencies and interested organizations and 197 individuals for a 45-day public review period. There were two Planning Commission study sessions held on December 2, 2005, and February 17, 2005. The Draft EIR was provided to the State Clearinghouse on January 20, 2005, for additional distribution to agencies. In addition, a public NOA of the Draft EIR appeared in the *Press Telegram* and was mailed directly to interested parties requesting the document. In addition, copies of this Draft EIR are published on the City of Long Beach Web site at http://www.longbeach.gov/plan/pb/epd/er.asp and are available during the public review period at several libraries. In addition, LBMMC entered into a VCA with DTSC to implemented additional California EPA requirements for public disclosure (more than 200 individuals received the Draft EIR). There is a Planning Commission meeting scheduled on May 5, 2005, and a City Counsel meeting scheduled in June 2005.

City of Long Beach
Attn: Ms. Anita Garcia
Dept of Planning and Building
City Hall, Fifth Floor
333 West Ocean Blvd
Long Beach, CA 90802

RECEIVED
MAR 10 2005
Planning and Building Dept.
Community Planning

Re: Long Beach Memorial

Dear Project Manager,

I am writing to comment on the Draft EIR for the construction project at Long Beach Memorial Medical Center.

The proposed expansion site is over contaminated soil from an old abandoned landfill and oil wells, which was never properly investigated nor cleaned up. During the construction process the contaminants from the soil will be uncovered, and the Draft EIR does not address how those contaminants will be monitored and handled.

These contaminants affect the safety of the residents in the neighborhood, as well as the patients in and going to the hospitals.

The public must be protected from any of the contaminants that may remain in the soil or be released in to the air.

Please address these concerns.

Sincerely,

Cara Farnell
355 Freeman Ave #8
Long Beach 90814

Cara Zarnell
355 Freeman Avenue, Apartment 8
Long Beach, California 90814

Response to Comment No. 1:

Thank you for the comments and concerns regarding the proposed project. The City of Long Beach Planning Commission will take the comments and concerns into consideration during the decision-making process.

Response to Comment No. 2:

As indicated in Section 3.5, Hazards and Hazardous Materials, of the Draft EIR, the proposed project is located in an area where soils containing petroleum hydrocarbons from oil field operations have been identified. The existence of abandoned and improperly abandoned oil wells, and the existence of petroleum hydrocarbon–contaminated soils, water, and buried construction debris have the potential to expose the public or the environment to risks related to potential release of hazards and hazardous materials. Site investigation, risk assessment, and site cleanup are being conducted under the guidance of the DTSC. According to DOGGR, all oil wells must be identified and properly abandoned prior to site redevelopment. Incorporation of appropriate mitigation measures (Hazards-1 through Hazards-15) during excavation of soils associated with the proposed project would be necessary to avoid hazards to the public or the environment. Contamination at the proposed project site will be remediated to a level that is determined to be safe for occupants of the proposed project.

Response to Comment No. 3, 4:

Thank you for the comment concerning potential impacts of constructing and operating hospital expansion at the contaminated location. Section 3.5, Hazards and Hazardous Materials, of the Draft EIR acknowledges that the proposed project may result in environmental impacts related to hazards and hazardous materials. Therefore, this issue has been analyzed in detail in the EIR. This analysis was undertaken to identify opportunities to avoid, reduce, or otherwise mitigate potential significant impacts from hazards and hazardous materials and to identify potential alternatives. The HRA was developed by SCS Engineers according to DTSC and U.S. EPA risk assessment guidance. In addition, an independent third-party review was completed by Kleinfelder. LBMMC has entered into a VCA with DTSC to complete the site characterization study and HRA. LBMMC worked directly with DTSC to finalize the mitigation measures specified in the EIR to ensure their adequacy in remediating health risks to below the level of significance.

Response to Comment No. 5:

The City of Long Beach understands the concerns and has addressed them in Volume III of the Final EIR for the Long Beach Memorial Medical Center Expansion. These comments will be reviewed by the City of Long Beach Planning Commission as part of the decision-making process.