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Assessment of Geotechnical Issues in Acute Care Facilities in California

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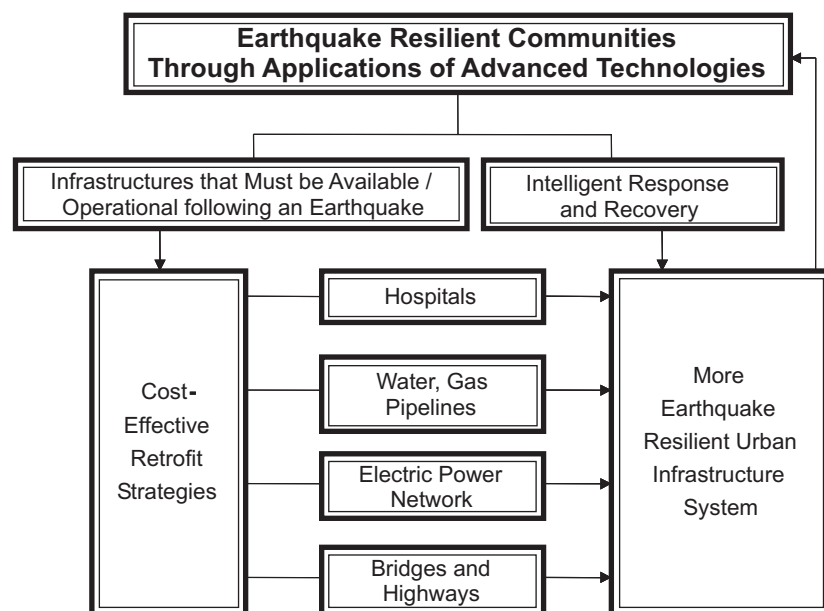
Preface

The Multidisciplinary Center for Earthquake Engineering Research (MCEER) is a national center of excellence in advanced technology applications that is dedicated to the reduction of earthquake losses nationwide. Headquartered at the University at Buffalo, State University of New York, the Center was originally established by the National Science Foundation in 1986, as the National Center for Earthquake Engineering Research (NCEER).

Comprising a consortium of researchers from numerous disciplines and institutions throughout the United States, the Center's mission is to reduce earthquake losses through research and the application of advanced technologies that improve engineering, pre-earthquake planning and post-earthquake recovery strategies. Toward this end, the Center coordinates a nationwide program of multidisciplinary team research, education and outreach activities.

MCEER's research is conducted under the sponsorship of two major federal agencies: the National Science Foundation (NSF) and the Federal Highway Administration (FHWA), and the State of New York. Significant support is derived from the Federal Emergency Management Agency (FEMA), other state governments, academic institutions, foreign governments and private industry.

MCEER's NSF-sponsored research objectives are twofold: to increase resilience by developing seismic evaluation and rehabilitation strategies for the post-disaster facilities and systems (hospitals, electrical and water lifelines, and bridges and highways) that society expects to be operational following an earthquake; and to further enhance resilience by developing improved emergency management capabilities to ensure an effective response and recovery following the earthquake (see the figure below).



A cross-program activity focuses on the establishment of an effective experimental and analytical network to facilitate the exchange of information between researchers located in various institutions across the country. These are complemented by, and integrated with, other MCEER activities in education, outreach, technology transfer, and industry partnerships.

This report summarizes the findings from an evaluation of geotechnical reports submitted as part of the compliance reports required by Senate Bill 1953 (SB 1953) for all hospitals in California. The geotechnical reports from 153 of the 470 licensed hospitals in California were reviewed with the cooperation of the California Office of Statewide Health Planning and Development. Most the reports were from hospital facilities in the major population centers around San Francisco Bay and in Southern California. Review of this data indicates that less than half of the hospital buildings in California in 2001 were considered to be structurally compliant with the requirements of SB 1953. Almost 40 % of the hospital buildings were determined to have significant risk for structural collapse and danger to public safety in the event of a strong earthquake. Over 70 % had basic nonstructural systems essential to life safety and patient care that were inadequately anchored to resist earthquake forces. The survey of the geotechnical evaluations indicated that about 20 % of the hospital sites had a potential for liquefaction based on the SB 1953 design ground motions. About one-half of these hospital facilities would experience total vertical liquefaction settlement of more than one inch. Much fewer sites were reported to have seismically-induced landsliding or surface fault rupture hazard.

ABSTRACT

This report summarizes the findings from an evaluation of geotechnical reports submitted as part of the compliance reports required by Senate Bill 1953 (SB 1953) for all hospitals in California. The geotechnical reports from 153 of the 470 licensed hospitals in California were reviewed through the cooperation of the California Office of Statewide Health Planning and Development. Most the reports were from hospital facilities in the major population centers around San Francisco Bay and in Southern California.

Review of the data submitted in the compliance reports indicates that less than half of the hospital buildings in California in 2001 were considered to be structurally compliant with the requirements of SB 1953. Almost 40 percent of the hospital buildings were determined to have significant risk for structural collapse and danger to public safety in the event of a strong earthquake. Over 70 percent of the hospital buildings had basic nonstructural systems essential to life safety and patient care that were inadequately anchored to resist earthquake forces.

The survey of the geotechnical evaluations indicated that about 20 percent of the hospital sites had a potential for liquefaction based on the SB 1953 design ground motions. About one-half of these hospital facilities would experience total vertical liquefaction settlement of more than one inch. Much fewer sites were reported to have seismically-induced landsliding or surface fault rupture hazard.

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SECTION 1 INTRODUCTION

The Northridge earthquake struck Southern California at 4:31 a.m. on January 17, 1994, causing many casualties and major destruction in its aftermath. There were 57 deaths and numerous injuries attributed to the earthquake and the economic losses have been estimated to exceed \$40 billion (Eguchi et al., 1996).

In times of great natural disaster and subsequent damage to structures, it has become a public expectancy that the healthcare service system be available to treat the potentially great number of resulting injuries. In the Northridge earthquake, it was reported that 11,846 persons were treated by 102 hospitals in three Southern California counties with 1,044 of those requiring hospital admission (Hall, 1995). The overwhelming majority of those being treated were in the San Fernando Valley, where the strongest ground motions were felt. Twenty-three local hospitals were reported to have suspended some or all of their services as a result of damage from the earthquake. The earthquake reportedly caused more than \$3 billion in damages to Southern California's hospitals (California Healthcare Association, 1999).

In reaction to the healthcare vulnerabilities revealed by the Northridge earthquake, the California State legislature passed Senate Bill 1953 (SB 1953) which established seismic requirements for all existing hospitals in the State of California. SB 1953 (Chapter 740, Statutes of 1994) was signed into law by Governor Pete Wilson just seven months after the Northridge earthquake. It required existing general acute care hospital buildings which are not in compliance with the Hospital Seismic Safety Act of 1972 to be seismically retrofitted, changed to non-acute care use, replaced or demolished by the year 2030.

With the enactment of SB 1953, every hospital in California was required to perform a compliance study for structural and nonstructural performance in earthquakes. Part of this study was an evaluation of the geologic and geotechnical hazards that may affect hospital performance in a seismic event. The purpose of this research was to mine the

wealth of data from the reports submitted by the hospitals to obtain a snapshot in time of the geologic and geotechnical hazards that affect hospitals and to relate those hazards to the expected performance of the currently operating hospitals in the State of California. It was necessary to include the structural and nonstructural performance of the hospitals in this study so as to correlate the information with the geologic and geotechnical hazards and pinpoint hospitals with that pose serious danger or potential failure during seismic events.

SECTION 2

HISTORY OF THE DEVELOPMENT OF SENATE BILL 1953

This narrative is partly based on information from the California Office of Statewide Health Planning and Development and from the observations of Mr. William T. Holmes. Mr. Holmes is a practicing structural engineer in California who has been actively involved in the design and analysis of hospitals in California and the shaping of guidelines and regulations embodied in SB 1953 (Holmes, 1996).

In direct response to the serious damage experienced by local hospitals in the San Fernando earthquake of February 7, 1971, the Alquist Hospital Seismic Safety Act was passed by the California State Legislature and signed into law in 1972. The intent of the Act was to enforce the following:

“hospitals, which house patients who have less than the capacity of normal healthy persons to protect themselves and which must be reasonably capable of providing services to the public after a disaster, shall be designed and constructed to resist forces generated by earthquakes...”

The 1972 Alquist Act applied to the construction of new hospitals and to alterations and remodeling of existing hospitals. The Alquist Act was based on an earlier similar act that applied to school building safety, the so-called Field Act, which was made law after extensive damage to school buildings in the Long Beach earthquake of 1933. In 1973, the Uniform Building Code (International Conference of Building Officials, 1973) was altered to compensate for the vulnerabilities of nonductile reinforced concrete construction and soft stories as well as other deficiencies in the then current construction practices which were exposed by the San Fernando earthquake. An example of the earthquake damage to the then new County of Los Angeles Olive View Medical Center in the San Fernando earthquake is shown in figure 2-1.



Figure 2-1 Olive View Medical Center – Damaged by the February 9, 1971, San Fernando Earthquake

However, the Alquist Hospital Seismic Safety Act was not retroactively applied to existing hospitals. It was expected that the existing nonconforming buildings would be eventually replaced by attrition with new conforming buildings. Unfortunately, many of these nonconforming buildings were still in service in 1994; an example of the damage to one of these nonconforming hospital buildings in the Northridge earthquake is shown in figure 2-2.



Figure 2-2 Saint John's Hospital and Health Center in Santa Monica, California, Damaged by the Northridge Earthquake in 1994

The Office of the State Architect was charged by the Act to create and enforce structural regulations through the Office of Statewide Health Planning and Development (OSHPD). Later, all enforcement functions for all aspects of hospital design and construction were centralized by law into OSHPD.

The Alquist Act also created the Building Safety Board (later known as the Hospital Building Safety Board and referred to hereafter as HBSB) to serve as an advisory and appeal panel to OSHPD. Shortly after its creation, the HBSB began to address the

earthquake performance of hospitals that did not conform to the Alquist Act. In 1983, the HBSB recommended that a plan be created to bring the pre-Act buildings into compliance over a 30-year period. Because of the time elapsed since the San Fernando earthquake and the lack of significant earthquake activity, there was no interest in initiating such a plan by the decision makers.

Also in the 1980s, several surveys of hospital seismic safety were conducted that strongly indicated problems with delivering health care in the event of major earthquakes. In 1982, the California Seismic Safety Commission conducted a survey evaluating the anticipated seismic performance of hospitals in the Los Angeles area because of the fear of the so-called “Palmdale Bulge” where it was believed that the ground was rising in the vicinity of the San Andreas fault, north of Los Angeles. The evaluations were based on visual inspection of facilities and a review of available drawings. The survey concluded that many of the hospital buildings would not survive a significant earthquake. The Applied Technology Council (1991) conducted an expanded survey to include all hospitals in California and found that two-thirds of the hospital buildings in California were constructed prior to the Alquist Act, with the normal replacement of the older facilities progressing at a very slow rate. The survey also found that many of the hospital facilities were potentially hazardous in a major earthquake.

In 1986, the California Hazards Reduction Act was passed which required the State’s Seismic Safety Commission to develop a five-year program to significantly reduce earthquake hazards in the state by the end of the 20th Century. The Commission published a report including recommendations addressing pre-Hospital Seismic Safety Act hospital buildings; the recommendations (referred to as Milestone 4) recalled the HBSB’s 1983 recommendation for a program to bring all hospital facilities into compliance with the Alquist Act by the year 2020 by requiring either vacation, replacement, or upgrading of existing facilities.

After the 1989 Loma Prieta earthquake struck the San Francisco Bay-Monterey Bay region, the HBSB developed a checklist in 1990 based on reported damage which

OSHPD sent to every hospital in the state. The checklist noted that some hospital systems were particularly vulnerable and deserved immediate evaluation. Many of these items were nonstructural in nature. The hospitals were “encouraged” to take action on the checklist.

In response to the Seismic Safety Commission’s Milestone 4 recommendations and the Loma Prieta earthquake, OSHPD proposed a program to deal with the pre-Act hospital buildings. The 1990 report (often referred to as the Milestone 4 Report) by HBSB was based on the earlier work and proposed a program to have a five-year evaluation and planning phase, followed by a thirty-year implementation phase to bring all buildings into compliance with the Alquist Act. The program would address both seismic strengthening of hospital structures and retrofitting of nonstructural systems and equipment. The program anticipated that some financial incentives or support would be available in some instances.

It was not until destruction and loss of services in the 1994 Northridge earthquake that the recommendations of Milestone 4 were transformed into law by SB 1953. The Northridge earthquake caused damage to many hospitals. OSHPD reported that 28 hospital buildings under their jurisdiction were posted with “yellow” or “red” tags indicating respectively that the buildings were “limited entry and restricted use” or “unsafe and entry may result in injury or death” (OSHPD, 1995). All 28 posted buildings were of pre-1973 construction (or pre-Act). The legislation was introduced in the California State Senate on February 22, 1994, (a little more than one month after the earthquake) and was signed into law by Governor Wilson on September 22, 1994.

SECTION 3 REQUIREMENTS OF SB 1953

SB 1953 incorporated some features of the Milestone 4 Report; however, it has its own set of requirements as listed below:

- Evaluation – each acute care hospital building is to be evaluated for its expected structural and nonstructural performance.
- Creation of a database of the hospital building stock – the database with the evaluation results is to be provided to the California Office of Emergency Services so that the conditions of all hospital buildings are known, to aid in future emergency response in the event of future earthquakes.
- Retrofit of buildings (structural and nonstructural) to prevent collapse and loss of life – this is a short term goal to retrofit hospital buildings in order to eliminate immediate life safety hazards that may exist.
- Retrofit of buildings to provide continual operation after an earthquake – longer term goal to provide hospital buildings that would not only provide minimal life safety, but also continue to be able to provide needed health care services in the event of an earthquake disaster.

OSHPD was given the responsibility and authority to prepare the regulations governing SB 1953. OSHPD was also given the responsibility to review and approve the submissions under SB 1953. The hospital owners were required by the law to evaluate each acute care hospital building for its expected structural and nonstructural performance during an earthquake according to guidelines stated in the SB 1953 regulations. In addition to the evaluations, the owners were also required to develop compliance plans to ensure that the hospital buildings will meet certain expected performance standards by the time milestones established in the regulations.

The SB 1953 regulations established Structural Performance Categories (SPC) that each building was to be evaluated for. The evaluations were to be made by licensed structural engineers and to be reviewed and approved by OSHPD. The SPC descriptions are given in the regulations and are summarized below (OSHPD, 2001):

- SPC-1 These buildings pose a significant risk of collapse and a danger to the public after a strong earthquake.

- SPC-2 These buildings are in compliance with the pre-1973 California Building Standards Code or other applicable standards, but are not in compliance with the structural provisions of the Alquist Act. These buildings do not significantly jeopardize life, but may not be repairable or functional following strong ground motion.

- SPC-3 These buildings are in compliance with the structural provisions of the Alquist Act. In a strong earthquake, they may experience structural damage that does not significantly jeopardize life, but may not be repairable or functional following strong ground motion. Buildings in this category will have been constructed or reconstructed under a building permit obtained through OSHPD.

- SPC-4 These are buildings in compliance with the structural provisions of the Alquist Act that may experience structural damage which could inhibit the building's availability following a strong earthquake. Buildings in this category will have been constructed or reconstructed under a building permit obtained through OSHPD.

- SPC-5 These buildings are in compliance with the structural provisions of the Alquist Act, and are reasonably capable of providing services to the public following strong ground motion. Buildings in this category have been constructed or reconstructed under a building permit obtained through OSHPD.

In addition, the hospitals were to provide evaluations of the nonstructural systems. SB 1953 required that nonstructural systems, including communications, emergency power supplies, bulk medical gas, fire alarms, and emergency lighting, be anchored and braced by January 1, 2002. The Nonstructural Performance Categories (NPCs) are given below (OSHPD, 2001):

- NPC-1 The basic systems essential to life safety and patient care are inadequately anchored to resist earthquake forces. Hospitals were to have braced the communications, emergency power, bulk medical gas and fire alarm systems in these buildings by January 1, 2002.

- NPC-2 In these buildings, essential systems vital to the safe evacuation of the building are adequately braced. The building is expected to suffer significant nonstructural damage in a strong earthquake.

- NPC-3 In these buildings, nonstructural systems are adequately braced in critical areas of the hospital. If the building structure is not badly damaged, the hospital should be able to provide basic emergency medical care following the earthquake.

- NPC-4 In these buildings, the contents are braced in accordance with current code. If the building is not badly damaged, the hospital building should be able to function, although interruption of the municipal water supply or sewer system may impede operations.

- NPC-5 These buildings meet all the above criteria and have water and wastewater holding tanks – sufficient for 72 hours of emergency operations – integrated into the plumbing systems. They also contain an on-site emergency system and are able to provide radiological service and an onsite fuel supply for 72 hours of acute care operation. (The anchorage and bracing exceed Code requirements.)

The regulations for SB 1953 have also set the timeline for compliance with the provisions of the law. The key dates are given below and in figure 3-1:

- January 1, 2001 SPC and NPC evaluations submitted to OSHPD
- January 1, 2001 Compliance plans submitted to OSHPD
- January 1, 2002 Bring nonstructural systems to at least NPC-2
- January 1, 2008 Retrofit, close or relocate from SPC-1, NPC-2; i.e., structures must be at least SPC-2 and NPC-3 compliant
- January 1, 2030 Retrofit, close or relocate from SPC-2, NPC-3 and NPC-4 (substantial compliance); i.e., structures must be at least SPC-3 and NPC-5 compliant

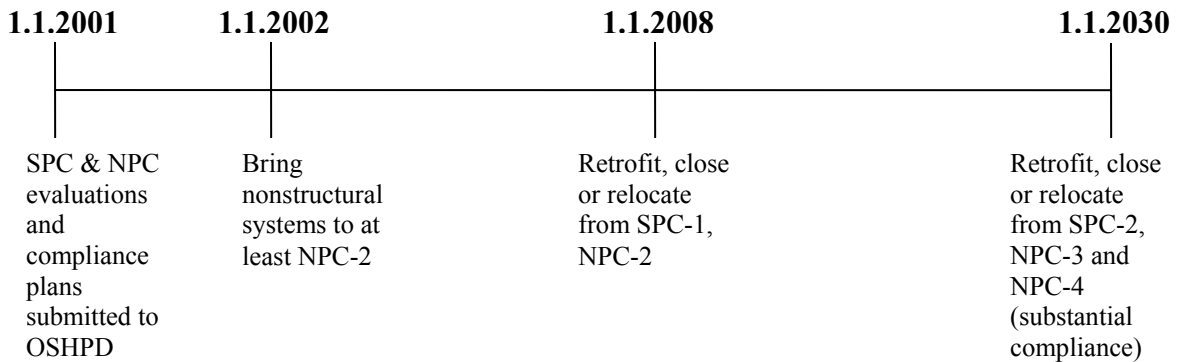


Figure 3-1 Timeline for Compliance with the Provisions of SB 1953

Since SB 1953 was passed, supplemental legislation has been approved by the California Legislature and the Governor that modify the compliance dates specified by SB 1953. These include Senate Bill 1801 (SB 1801) passed in the year 2000 which allows for a five year extension of the January 1, 2008 deadline to retrofit, close or relocate from an SPC-1, NPC-2 building. The extension to January 1, 2013 requires that the hospital owner demonstrate that compliance with SB 1953 would "...result in a loss of health care

capacity that may not be provided by other general acute care hospitals within a reasonable proximity.”

Senate Bill 2006 (SB 2006), also passed in the year 2000, allows a hospital located in Seismic Zone 3 as indicated in the 1995 edition of the California Building Standards Code to request an exemption from the NPC-3 requirements if the hospital building complies with the 2002 nonstructural requirements. These buildings, however, would need to meet the January 1, 2030, nonstructural requirements to continue operation after that date.

A report prepared for the California HealthCare Foundation by the RAND Corporation (Meade et al., 2002) has found that approximately 50 percent of California’s hospital buildings will be retrofitted, reconstructed, or closed by the year 2030 to meet the requirements of SB 1953. RAND also estimates that approximately 75 percent of the buildings will undergo nonstructural renovations to improve operational capabilities following a large earthquake. RAND estimates that the total expenditures by hospitals for this construction program may be as large as \$41.7 billion. About \$41 billion would be allocated for the reconstruction of structurally noncompliant buildings as defined by SB 1953 and \$0.7 billion for the nonstructural retrofits of existing buildings.

SECTION 4 EVALUATION FOR FOUNDATIONS AND GEOLOGIC SITE HAZARDS

Article 9 of the SB 1953 regulations contains requirements for the seismic evaluation of the building foundations, assessment of the capability of the soil beneath the foundation to withstand forces applied during earthquakes, and evaluation of nearby geologic hazards that may affect the stability of the foundations. Article 9 also dictates that geologic and local site conditions that can lead to building structural damage and threaten life safety in an earthquake be addressed. The regulations state that in the seismic evaluation for life safety concerns, "...it is necessary to investigate the site to establish that there are no geologic site hazards present, or, if they are present, that their threat is not significant or is mitigated by design." Article 9, Section 9.3 specifically mentions the hazards of liquefaction, slope failure, and surface fault rupture.

Article 9.3.1 describes liquefaction hazard evaluation to determine the presence of "liquefaction susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance..." The evaluation is to consider "...the foundation soils at depths within 50 feet under the building." The liquefaction hazard is described in the Article by the following:

"The deficiency is the potential for liquefaction that will result in vertical settlement and potential loss of foundation support for spread footings, or for lateral spreading of liquefied soils that can occur on nearly flat slopes and can be detrimental to the foundation system. Evaluate the liquefaction potential and consequences of vertical settlement or lateral movement of the foundations. Conforming buildings which fail this check shall be placed in SPC-4."

An example of the damage caused by liquefaction and related lateral spreading during the 1971 San Fernando earthquake is shown in figure 4-1.



Figure 4-1 Liquefaction and Lateral Spreading Damage to Los Angeles County Juvenile Hall Facility, Sylmar, California. Photograph Courtesy of Jack Meehan

Article 9.3.2 describes the slope failure hazard evaluation to determine the following: “The building site is sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or is capable of accommodating small predicted movements without failure.” The evaluation requirements are:

“Evaluate the likely movements associated with seismically induced slope failures beneath, above, or adjacent to the building and their effect on the structural integrity of the building. Conforming buildings which fail this check shall be placed in SPC-4.”

Article 9.3.3 describes the evaluation for surface fault rupture and surface displacement hazard. It is necessary to:

“Evaluate the proximity of known active faults to the building. If the potential for surface fault rupture and surface displacement at the building site is present, nonconforming buildings shall be placed in SPC-1. Conforming buildings that fail this check shall be placed in SPC-4.”

An example of a school building that collapsed in Central Taiwan due to surface fault rupture in 1999 is shown in figure 4-2.

Article 2 of the SB 1953 regulations specifies that an “Engineering Geological Report” must be prepared on the site’s geologic and seismic conditions consistent with the requirements of California Title 24, Section 1634A (California Building Code). This Engineering Geological Report was to be submitted with the hospital’s evaluation report to OSHPD. Such reports are not required for one-story, wood-frame and light steel-frame buildings of Type II or Type V construction and 4,000 square feet or less in floor area. The regulations also allow for a previous report for a specific site to be resubmitted, provided that a reevaluation is made and subject to approval by OSHPD.



Figure 4-2 Collapsed Middle School Building in Central Taiwan Due to Surface Rupture of Chelungpu Fault in September 1999

SECTION 5 HOSPITAL DATABASE

The hospital compliance reports for each hospital in California were to be submitted to OSHPD on January 1, 2001; however, under some circumstances, the submittal of the compliance reports could be deferred until January 1, 2002. According to OSHPD, as of April 19, 2001, the total number of hospital facilities required to report was 474. Of this number, some 436 hospital facilities filed reports covering a total of 2,507 buildings. It should be noted that not all of the reports included an engineering geological report. The best estimate of the number of hospitals that filed geological reports to date is approximately 273. A summary of the reported hospital building seismic performance categories, both structural (SPC) and nonstructural (NPC), have been published by OSHPD (2001).

This study presents the evaluation of the geotechnical information (“Engineering Geological Reports”) submitted as part of the hospital compliance reports for SB 1953. The original plan of this research project was to survey 248 hospital facilities in California, about one-half of the total number of facilities in the State. The facilities to be surveyed were in two contiguous sets of counties in Northern and Southern California. These two sets were: (1) San Francisco, San Mateo, Santa Clara, Contra Costa and Alameda; and (2) Los Angeles, Orange and San Diego. These two sets of counties in Northern and Southern California were selected because they represent the major population centers of California with fairly dense concentrations of hospital facilities. Also, it was expected that the hospital facilities in these two areas would be of moderate to large proportions. It was also felt that some of the hospital facilities in the less populated counties would be smaller and that some, because of their size and construction, might not be required to submit “Engineering Geological Reports.”

The available compliance reports on file with OSHPD in the Gregory Bateson State Office Building in Sacramento, California, were reviewed. The geotechnical information was summarized in the “Engineering Geologic Reports.” It should be noted that OSHPD did not have all the reports in its office at the time of our visit as some reports and files

were still in the process of review and filing. Thus it was not possible to access the number of reports originally estimated. In the final survey, 186 hospital facilities were surveyed (about one-third of all facilities in the state instead of half). Some of these facilities had only structural or only Engineering Geology Reports. In addition to the original list of counties to be covered, listed above, it was decided to review reports in Marin County available at OSHPD so as to supplement the Northern California set; reports were also available for several hospitals in Humboldt, Monterey, Napa, San Joaquin, Solano, Sonoma and Stanislaus Counties in MACTEC's files and hence it was also decided to include these in the study. It was determined that the Southern California set would be supplemented with reports available from OSHPD in Riverside, San Bernardino, and Ventura counties; individual reports for hospitals in Kern and San Luis Obispo counties available from MACTEC were also added. The compliance reports were also reviewed and basic structural information and SPC ratings were summarized.

While this study could not survey the planned 248 facilities in the State of California, there are 1,072 buildings included in this survey of the 154 facilities that had available structural reports. The number of buildings included in this study is almost 43 percent of the total number of hospital buildings in the state. The general statistics of the SPC and NPC ratings for all of the reporting hospital buildings published by OSHPD matches well with the statistics of the SPC and NPC ratings of the buildings included in this study, as shown later in this report. While it may be difficult to draw the conclusion that the results of this study may be applicable to the entire State of California, it appears reasonable at least to conclude that the results are applicable to the major population centers of Northern and Southern California from which most of the samples were taken.

In Northern California, the available compliance reports for hospital facilities in the Bay Area counties of San Francisco, San Mateo, Santa Clara, Contra Costa, Alameda, and Marin were the main focus of attention. In Southern California, the available compliance reports for hospital facilities for Los Angeles, Orange, San Diego, Riverside, San Bernardino, and Ventura Counties were of most interest. Figures 5-1 and 5-2, and table 5-1 show the distribution by county of hospital facilities studied in this report.

Table 5-1 Distribution of Hospitals Reviewed for this Report by County

County	Number of Hospitals Reviewed	Total in County	Percent Obtained
Alameda	11	19	57.9
Contra Costa	4	12	33.3
Humboldt	2	5	40.0
Kern	1	12	8.3
Los Angeles	74	122	60.7
Marin	3	4	75.0
Monterey	1	4	25.0
Napa	1	2	50.0
Orange	24	39	61.5
Riverside	7	17	41.2
San Bernardino	4	21	19.1
San Diego	14	29	48.3
San Francisco	12	14	85.7
San Joaquin	1	8	12.5
San Luis Obispo	1	5	20.0
San Mateo	3	9	33.3
Santa Clara	10	14	71.4
Solano	1	4	25.0
Sonoma	3	10	30.0
Stanislaus	1	6	16.7
Ventura	8	9	88.9
<i>Total</i>	<i>186</i>	<i>365</i>	

Tables 5-2 and 5-3 provide the listings of the 186 hospital facilities in Northern and Southern California, respectively, for which compliance reports (with structural and/or geotechnical reports) were reviewed for this study. The tables also list the geotechnical consultant who provided each “Engineering Geologic Report.” Please note that the reports by LAW/Crandall were obtained from MACTEC Engineering and Consulting, Inc., formerly known as LAW/Crandall, from their Los Angeles, California, office. These reports may or may not also be available at the OSHPD office in Sacramento. The facility numbers listed in the tables were given by OSHPD. The locations of the hospitals in this study are shown by the OSHPD facility numbers in the maps of figures 5-3 to 5-9. Also shown on figures 5-3 to 5-9 are the liquefaction hazard zones delineated by the California Geological Survey. It should be noted that the mapping of the hazard zones is

still in progress and the zones shown on the figures are only those published as of December 2003.

Northern California Hospital Distribution by County

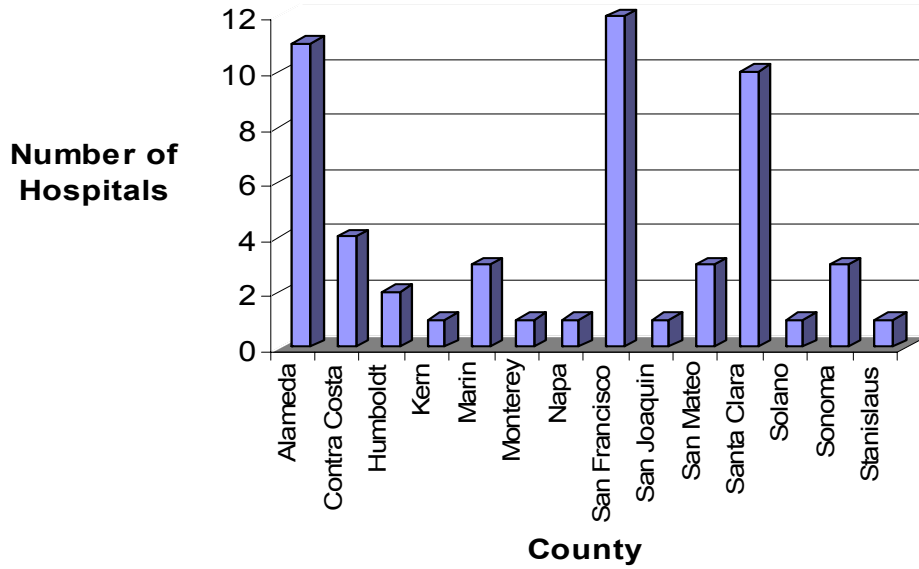


Figure 5-1 Number of Northern California Hospitals Reviewed in this Report by County

Southern California Hospital Distribution by County

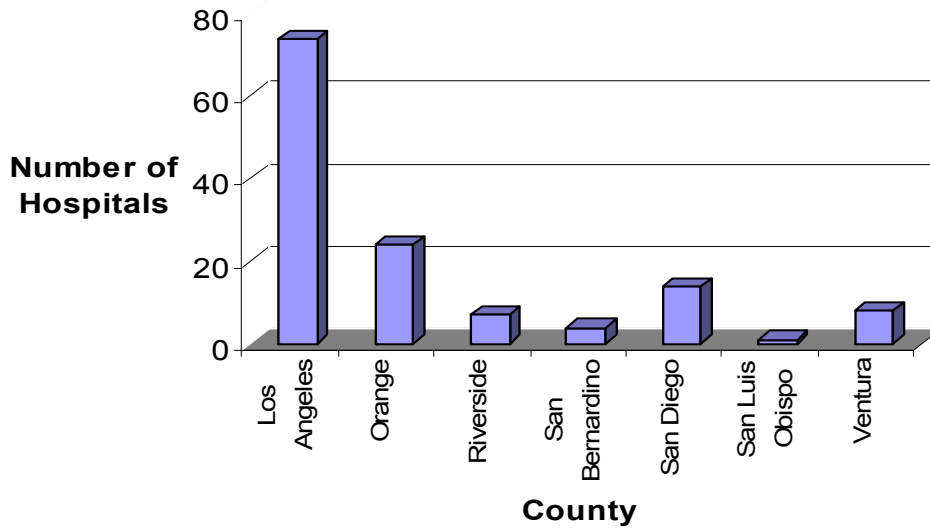


Figure 5-2 Number of Southern California Hospitals Reviewed in this Report by County

Table 5-2 Hospital Facilities in Northern California Reviewed For This Study

County	Facility Name	Fac. No.	Structural Report By	Geotechnical Report By
Alameda	Alameda Hospital	11210	Dasse Design	Dasse Design
	Washington Hospital	11366	Dasse Design	Dasse Design
	San Leandro Hospital	11256	Wou & Partners	Geobase
	Alta Bates Medical Center - Ashby Campus	11214	Degenkolb	Geomatrix
	Alta Bates Medical Center - Herrick Campus	11285	Degenkolb	Geomatrix
	Kindred Hospital - San Francisco Bay Area (a.k.a. Vencor Hosp. - San Leandro)	11321	Mullen, Morris Alexander	Harlen Tate Geologist
	St. Rose Hospital	11344	Dasse Design	HARZA
	Summit Medical Center - North Pavilion	11322	Degenkolb	HARZA
	Summit Medical Center - South Pavilion	11338	Degenkolb	HARZA
	Children's Hospital Oakland	11242	Rutherford & Chekene	OSHPD
	Eden Medical Center	11260	Cole / Yee / Schubert & Assoc.	Not Available
Contra Costa	Mt. Diablo Medical Center	10048	Dasse Design	Kaldveer Associates
	Doctors Medical Center Pinole	10055	John A. Martin & Assoc.	LAW/Crandall
	Doctors Medical Center San Pablo	10038	John A. Martin & Assoc.	LAW/Crandall
	John Muir Medical Center	10081	Dasse Design	Woodward Clyde
Humboldt	Redwood Memorial Hospital	10183	Not Available	LAW/Crandall
	Saint Joseph Hospital - Eureka	10184	Not Available	LAW/Crandall
Kern	San Joaquin Community Hospital	12881	Not Available	LAW/Crandall
Marin	Marin General Hospital	10273	Dasse Design	Dasse Design
	Kaiser San Rafael Medical Center	10268	Degenkolb	Degenkolb Engineers
	Kentfield Rehabilitation Hospital	10261	Dettmer Architecture	Dettmer Architecture
Monterey	Salinas Valley Memorial Hospital	10348	Not Available	Harding Lawson Associates

**Table 5-2 Hospital Facilities in Northern California Reviewed For This Study
(cont'd)**

County	Facility Name	Fac. No.	Structural Report By	Geotechnical Report By
Napa	Queen of the Valley Hospital - Napa	10362	Not Available	LAW/Crandall
San Francisco	San Francisco Geary Medical Center	12430	Degenkolb	Degenkolb
	St. Luke Hospital	12459	Degenkolb	Degenkolb
	California Pacific Medical Center - California West Campus	12404	Dasse Design	Fugro West
	California Pacific Medical Center - California Sacramento Campus	12421	Dasse Design	Fugro West
	California Pacific Medical Center - Pacific Campus	12482	Dasse Design	Furgo West
	Kaiser- South San Francisco Medical Center	13086	Degenkolb	Geomatrix
	San Francisco General Hosp.	12463	Degenkolb	Harding ESE
	Saint Francis Memorial Hosp.	12457	John A. Martin & Assoc.	Harding ESE
	St. Mary Medical Center	12460	Degenkolb	Not Available
	UCSF at Mount Zion Medical Center	12443	Degenkolb	Treadwell & Rollo
	UCSF Medical Center	12476	Degenkolb	Not Available
	Davies Medical Center	12416	Rutherford & Chekene	Not Available
San Joaquin	Doctors Hospital of Manteca	10745	Not Available	LAW/Crandall
San Mateo	Catholic Healthcare West Seton Medical Center	10801	Degenkolb	Geomatrix
	Sequoia Hospital	10811	Degenkolb	Geomatrix
	San Mateo County Health Center	10810	Dasse Design	Harding ESE
Santa Clara	El Camino Hospital	10883	Dasse Design	Dasse Design
	Columbia Good Samaritan Hospital	10890	Wou & Partners	Geobase
	Mission Oaks Hospital	10878	Wou & Partners	Geobase
	San Jose Medical Center	10932	Wou & Partners	Geobase
	Catholic Healthcare West, O'Connor Hospital	10919	Degenkolb	Geomatrix
	Community Hospital of Los Gatos	10874	John A. Martin & Assoc.	LAW/Crandall
	Regional Medical Center of San Jose	10856	Wou & Partners	LAW/Crandall
	Stanford Medical Center	10943	Rutherford & Chekene	Rutherford & Chekene

**Table 5-2 Hospital Facilities in Northern California Reviewed For This Study
(cont'd)**

County	Facility Name	Fac. No.	Structural Report By	Geotechnical Report By
Santa Clara	Santa Clara Valley Medical Center	10935	Ove Arup & Partners Calif. Ltd. and C+D Consulting Civil & Structural Engineers	Woodward Clyde
	Kaiser – Santa Teresa Medical Center	12952	Degenkolb	Not Available
Solano	Kaiser – Rehabilitation Center Vallejo	13142	Not Available	Harding ESE
Sonoma	Palm Drive Hospital	11052	Not Available	Harding ESE
	Petaluma Valley Hospital	14568	Not Available	LAW/Crandall
	North Coast Health Care Centers-Sotoyome	11054	Not Available	LAW/Crandall
Stanislaus	Doctors Hospital of Modesto	11085	Not Available	LAW/Crandall

Table 5-3 Hospital Facilities in Southern California Reviewed For This Study

County	Facility Name	Fac. No.	Structural Report By	Geotechnical Report By
Los Angeles	Hollywood Community Hospital of Hollywood	11718	Thompson & La Brie	Not Available
	Citrus Valley Medical Center - Inter-Community Campus	11748	Thompson & La Brie	Not Available
	Lancaster Community Hospital	11774	Thompson & La Brie	Not Available
	Los Angeles Community Hospital of Norwalk	11910	Thompson & La Brie	Not Available
	Queen of the Valley Medical Center - Queen of the Valley Campus	11971	Thompson & La Brie	Not Available
	Foothill Presbyterian Hospital Johnston Memorial - Glendora	13093	Thompson & La Brie	Not Available
	Vencor Los Angeles a.k.a. Kindred Hospital Los Angeles	11414	Mullen Morris Alexander, Inc.	Associated Soils Engineers
	UCLA Santa Monica Hospital	12033	John A. Martin & Assoc.	Converse Consultants
	Granada Hills Community Hospital	11688	Thompson & La Brie	Converse Consultants West
	Los Angeles County Rancho Los Amigos National Rehabilitation Center	11976	Dames & Moore	Dames & Moore Group
	West Hills Medical Center	12182	Wou & Partners	Geobase
	California Hospital Medical Center	11480	Degenkolb	Geomatrix
	San Gabriel Valley Medical Center	11548	Degenkolb	Geomatrix
	Robert F. Kennedy Medical Center	11706	Degenkolb	Geomatrix
	St. Mary Medical Center, Long Beach	12012	Degenkolb	Geomatrix
	Huntington Memorial Hospital	11733	HDR Architects, Taylor & Gaines	HDR Architects
	Verdugo Hills Hospital	12551	Taylor & Gaines, NBBJ Design	J. Byer Group
	Daniel Freeman Marina Hospital	12744	Cannon / Dworsky	LAW/Crandall
	Pacific Alliance Medical Center	11646	Degenkolb	LAW/Crandall
	Glendale Memorial Hospital	11844	Degenkolb	LAW/Crandall
Northridge Hospital Medical Center – Roscoe Campus	11906	Degenkolb	LAW/Crandall	

**Table 5-3 Hospital Facilities in Southern California Reviewed For This Study
(cont'd)**

County	Facility Name	Fac. No.	Structural Report By	Geotechnical Report By
Los Angeles	Northridge Hospital Medical Center – Sherman Way	12137	Degenkolb	LAW/Crandall
	Cedars Sinai Medical Center	11891	Fields Devereaux w/ Degenkolb	LAW/Crandall
	Centinela Hopital Medical Center	11510	John A. Martin & Assoc.	LAW/Crandall
	Whittier Hospital Medical Center	12201	John A. Martin & Assoc.	LAW/Crandall
	Suburban Medical Center	12787	John A. Martin & Assoc.	LAW/Crandall
	Greater El Monte Community Hosp.	13224	John A. Martin & Assoc.	LAW/Crandall
	Queen of Angels – Hollywood Presbyterian Medical Center	11722	John A. Martin & Assoc, Inc.	LAW/Crandall
	Antelope Valley Hospital	11399	John A. Martin & Assoc.	LAW/Crandall
	Brotman Medical Center	11848	John A. Martin & Assoc.	LAW/Crandall
	St. Luke Medical Center	12011	John A. Martin & Assoc.	LAW/Crandall
	Little Company of Mary Original	11787	KPFF	LAW/Crandall
	Downey Community Hospital	12235	KPFF	LAW/Crandall
	Torrance Memorial Medical Center	12249	KPFF	LAW/Crandall
	Daniel Freeman Memorial Hospital	11645	Lee, Burkhart, Liu	LAW/Crandall
	Monterey Park Hospital	12878	Lee, Burkhart, Liu; John A. Martin & Assoc.	LAW/Crandall
	Los Angeles County Harbor/UCLA Medical Center	11809	LA County Dept. Of Public Works	LAW/Crandall
	Kaiser Permanente Harbor City Medical Center	11758	Not Available	LAW/Crandall
	Kaiser Permanente Panorama City Medical Center	11759	Not Available	LAW/Crandall
	Long Beach Memorial Medical Center	11846	Not Available	LAW/Crandall
	Los Robles Regional Medical Center	11164	Wou & Partners	Not Available

**Table 5-3 Hospital Facilities in Southern California Reviewed For This Study
(cont'd)**

County	Facility Name	Fac. No.	Structural Report By	Geotechnical Report By
Los Angeles	Pacific Hospital of Long Beach	11927	Not Available	LAW/Crandall
	Saint John's Hospital and Health Center	12006	Not Available	LAW/Crandall
	Valley Presbyterian Hospital	12140	Not Available	LAW/Crandall
	Kaiser Permanente- West Los Angeles	12875	Not Available	LAW/Crandall
	Tarzana Regional Medical Center	13085	Not Available	LAW/Crandall
	University of Southern California – University Hospital	16483	Not Available	LAW/Crandall
	Century City Medical Plaza	12874	Nabih Youssef & Associates	LAW/Crandall
	Beverly Hospital	11441	Pedro C. Costa Architects	LAW/Crandall
	Providence Holy Cross Medical Center-Mission Hills	11726	Sobin-Harte Achitects.	LAW/Crandall
	Sherman Oaks Hospital	12047	Sobin-Harte Architects, Taylor and Gaines, SMW Consulting Engineers	LAW/Crandall
	San Pedro Peninsula Hospital	12023	Taylor & Assoc. Architects	LAW/Crandall
	White Memorial Medical Center	12198	Taylor & Assoc. Architects	LAW/Crandall
	Santa Marta Hospital	12985	Taylor & Assoc. Architects	LAW/Crandall
	Glendale Adventist Medical Center	11668	Taylor & Gaines	LAW/Crandall
	Motion Picture and Television Fund Hospital	11887	Taylor & Gaines	LAW/Crandall
	City of Hope National Medical Center	11527	The Design Management Group, Inc	LAW/Crandall
	Presbyterian Inter-Community Hospital	11968	Thompson & La Brie	LAW/Crandall
	Barlow Respiratory Hospital	11417	Thompson & La Brie	LAW/Crandall

**Table 5-3 Hospital Facilities in Southern California Reviewed For This Study
(cont'd)**

County	Facility Name	Fac. No.	Structural Report By	Geotechnical Report By
Los Angeles	USC Kenneth Norris Cancer Hospital	15179	KHA Design Group, Inc./ Akal Engineers	LeRoy Crandall and Associates
	Midway Hospital Medical Center	11863	John A. Martin & Assoc.	LeRoy Crandall and Associates
	Saint Vincent Medical Center	12014	Degenkolb	MACTEC Engineering and Consulting
	Bellwood General Hospital	11430	Thompson & La Brie	Thompson & La Brie
	Los Angeles Community Hospital	11545	Thompson & La Brie	Thompson & La Brie
	Martin Luther King, Jr./Charles R. Drew Medical Center	12259	Dames & Moore	URS
	High Desert Hospital	11865	Dames & Moore	URS
	Los Angeles County Olive View – UCLA Medical Center	15801	Dames & Moore, Taylor & Gaines	URS
	Mission Community Hospital	11847	URS Greiner Woodward Clyde, Taylor & Gaines	URS Greiner Woodward Clyde
	Children’s Hospital of Los Angeles	11525	John A. Martin & Assoc./ Haines & Oakley Architects	Woodward Clyde
	Kaiser Permanente Medical Center – Baldwin Park	17207	Degenkolb	Not Available
	Doheny Eye Institute	15535	John A. Martin & Assoc.	Not Available
	Doctors Hospital Of West Covina	12180	Myers, Houghton & Partners	Not Available
	Tri-City Regional Medical Center	12841	Sobin-Harte Achitects, and SHA Structural Engineers	Not Available
Methodist Hospital of Southern California	11858	Taylor & Gaines	Not Available	
Orange	University of California, Irvine Medical Center	10446	Degenkolb	Earth Research Associates
	Kaiser Permanente Anaheim Medical Center	13078	Degenkolb	Geotechnical Professionals

**Table 5-3 Hospital Facilities in Southern California Reviewed For This Study
(cont'd)**

County	Facility Name	Fac. No.	Structural Report By	Geotechnical Report By
Orange	Saddleback Memorial Medical Center	12755	Caruna & Assoc.	LAW/Crandall
	Los Alamitos Medical Center	10440	John A. Martin & Assoc.	LAW/Crandall
	Chapman Medical Center	10400	John A. Martin & Assoc.	LAW/Crandall
	Western Medical Center - Anaheim	13061	John A. Martin & Assoc.	LAW/Crandall
	Irvine Medical Center	16319	John A. Martin & Assoc.	LAW/Crandall
	Western Medical Center - Santa Ana	18007	John A. Martin & Assoc.	LAW/Crandall
	Santa Ana Hospital	10456	John A. Martin & Assoc.	LAW/Crandall
	Fountain Valley Regional Hospital	12834	John A. Martin & Assoc.	LAW/Crandall
	St. Jude Medical Center	10458	KPFF	LAW/Crandall
	Mission Hospital Regional Medical Center	12804	KPFF	LAW/Crandall
	St. Joseph Health System	10457	KPFF	LAW/Crandall
	Anaheim Memorial Hospital	10382	Taylor & Assoc. Architects	LAW/Crandall
	Hoag Memorial Hospital Presbyterian	10428	Taylor & Assoc. Architects	LAW/Crandall
	Placentia-Linda Community Hospital	13077	John A. Martin & Assoc.	LeRoy Crandall and Assoc.
	Vencor Hospital - Brea (a.k.a. Kindred Hospital - Brea)	13068	Mullen Morris Alexander, Inc.	Zeiser Kling
	Vencor Hospital - Orange County	10476	Mullen, Morris Alexander Inc.	Zeiser Kling
	Children's Hospital at Mission (CHOC at Mission)	10922	KPFF	Not Available
	San Clemente Hospital and Medical Center	13066	Popov Engineers	Not Available
	Specialty Hospital of Southern California - Santa Ana Campus	10407	Studio 5 Architects	Not Available
	South Coast Medical Center	10468	Taylor & Gaines	Not Available
Orange County Community Hospital	10439	Thompson & La Brie	Not Available	
Orange Coast Memorial Medical Center	15630	Wou & Partners	Not Available	
Riverside	Desert Regional Medical Center	10537	Not Available	LAW/Crandall
	Hemet Valley Medical Ctr.	10541	Not Available	LAW/Crandall

**Table 5-3 Hospital Facilities in Southern California Reviewed For This Study –
(cont'd)**

County	Facility Name	Fac. No.	Structural Report By	Geotechnical Report By
Riverside	John F. Kennedy Memorial Hosp.	10545	Not Available	LAW/Crandall
	Parkview Community Hospital Medical Center	10554	Not Available	LAW/Crandall
	San Gorgonio Memorial Hosp.	10559	Not Available	LAW/Crandall
	Rancho Springs Medical Center	16681	Not Available	LAW/Crandall
	Corona Regional Medical Center-Main	10526	Not Available	LAW/Crandall
San Bernardino	Mountains Community Hospital	10681	Not Available	LAW/Crandall
	Saint Mary Regional Medical Center	10695	Not Available	LAW/Crandall
	San Antonio Community Hosp.	10696	Not Available	LAW/Crandall
	Victor Valley Community Hosp.	10707	Not Available	LAW/Crandall
San Diego	Kaiser Foundation Hospital - San Diego	13111	Degenkolb	Not Available
	UCSD/La Jolla - Thornton Hospital	11659	Kaplan McLaughlin Diaz	Not Available
	Vencor Hospital San Diego	12328	Mullen, Morris & Alexander	Not Available
	Tri-City Medical Center	12372	Stichler	Not Available
	Children's Hospital - San Diego	12285	URS	Not Available
	Univ. of Calif., San Diego - Hillcrest Medical Center	12359	Kaplan McLaughlin Diaz	CCA Southland
	Scripps Memorial Hospital - Chula Vista	12268	URS	Dames & Moore Group
	Scripps Mercy Hospital	12339	URS/Dames & Moore	Dames & Moore Group
	Palomar Medical Center	12347	URS/Dames & Moore	Dames & Moore Group
	Scripps Memorial Hospital - La Jolla	12363	URS/Dames & Moore	Dames & Moore Group
	Paradise Valley Hospital	12348	Degenkolb	Geotechnics
	Sharp Memorial Hospital	12364	KPFF	Group Delta Consultants
Alvarado Hospital Medical Center	12872	Lee, Burkhart, Liu; John A. Martin & Assoc.	LAW/Crandall	

**Table 5-3 Hospital Facilities in Southern California Reviewed For This Study –
(cont'd)**

County	Facility Name	Fac. No.	Structural Report By	Geotechnical Report By
San Diego	Sharp Coronado Hospital	12295	KPFF/Taylor & Gaines	LeRoy Crandall and Associates
San Luis Obispo	Sierra Vista Regional Medical Center	10778	Not Available	LAW/Crandall
Ventura	Santa Paula Memorial Hospital	11175	Brandow & Johnston Assoc.	Earth Systems
	Los Robles Regional Medical Center	11164	Not Available	Geobase
	Simi Valley Hospital	11177	Not Available	LAW/Crandall
	Community Memorial Hospital	11159	John A. Martin & Assoc.	LAW/Crandall
	Ojai Valley Community Hospital	11169	Puchlik Design Associates	Not Available
	Ventura County Medical Center	11162	EQE International	SGD Inc.
	St. John's Regional Medical Center	11172	Degenkolb	Not Available
	St. John's Pleasant Valley Hospital	13181	Degenkolb	Not Available



Figure 5-4 Hospitals in this Study Identified by OSHPD Facility Number in Humboldt County

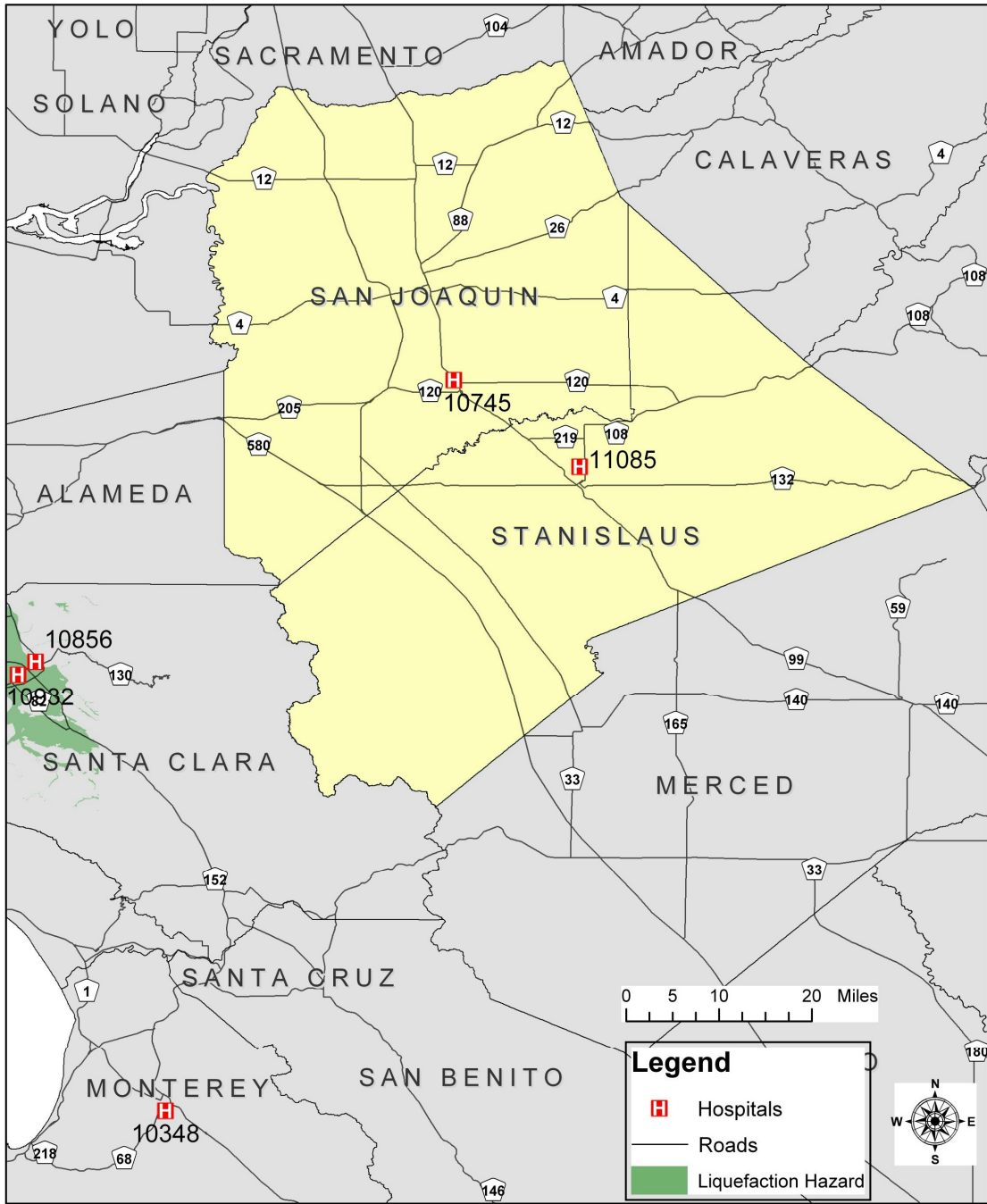


Figure 5-6 Hospitals in this Study Identified by OSHPD Facility Number in San Joaquin County

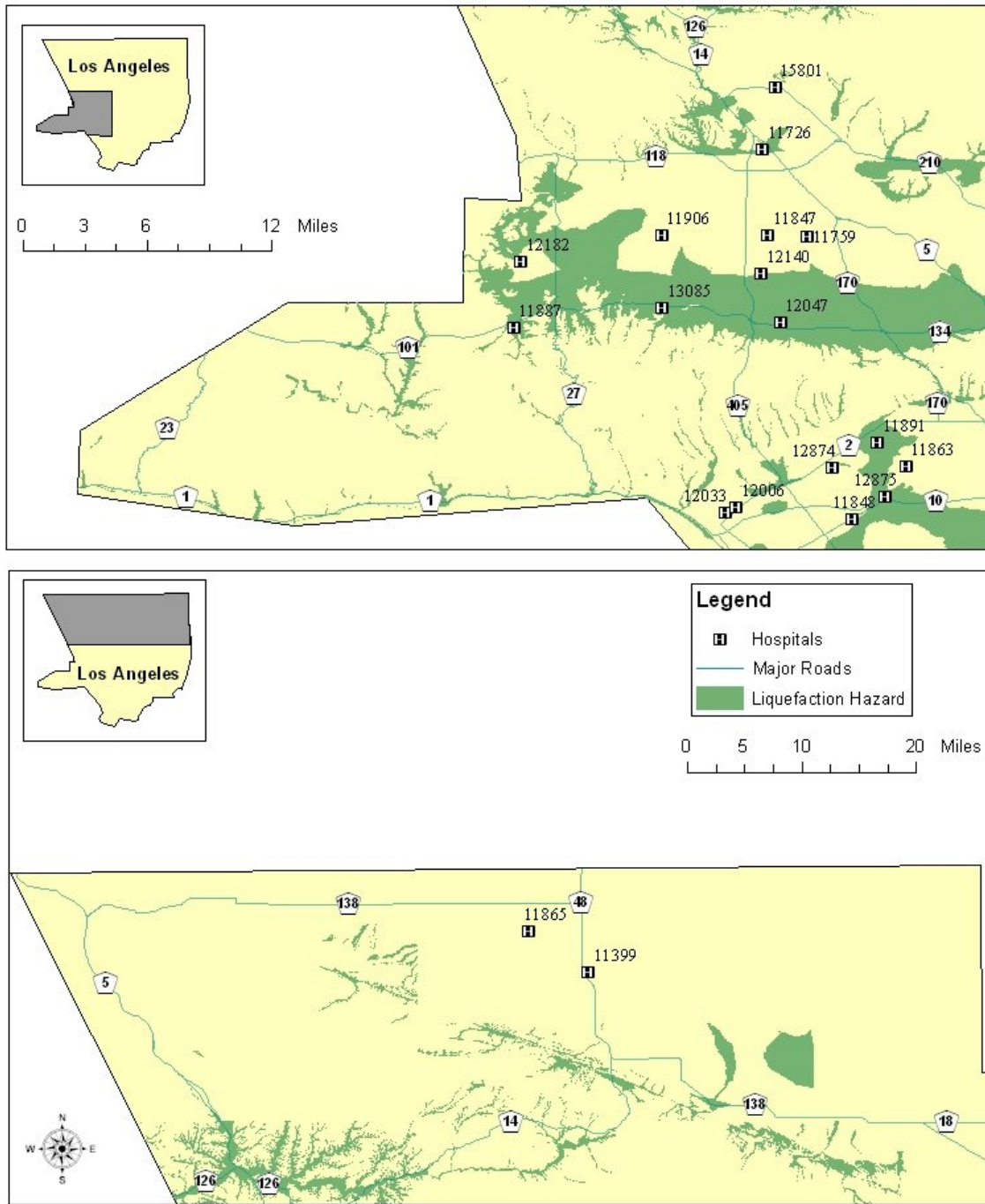


Figure 5-7 Hospitals in this Study Identified by OSHPD Facility Number in Northern and Western Los Angeles County



Figure 5-9 Hospitals in this Study Identified by OSHPD Facility Number in the Counties of Orange, Riverside, San Bernardino, and San Diego

**SECTION 6
EXPECTED SEISMIC PERFORMANCE OF HOSPITALS**

6.1 Hospital Statistics on Seismic Performance Categories from SB 1953 Reports

OSHPD published a report on April 19, 2001, (OSHPD, 2001) that summarized the Seismic Performance Categories (both structural and nonstructural) for the 436 hospital facilities that had submitted their compliance reports. Table 6-1 presents the summary of the reported Structural Performance Category (SPC) and Nonstructural Performance Category (NPC) ratings for all buildings reported. It was important for this study to present both the structural and nonstructural information for the hospitals discussed in order to give a better understanding of the potential danger and nonoperability of the hospitals when serious structural or nonstructural problems could be amplified by a serious geologic or geotechnical concern.

Table 6-1 Summary of Seismic Performance Categories Reported as of April 19, 2001 (OSHPD, 2001)

Number of Buildings in Each Seismic Performance Category	
SPC-1 = 975	NPC-1 = 1,807
SPC-2 = 211	NPC-2 = 430
SPC-3 = 291	NPC-3 = 63
SPC-4 = 672	NPC-4 = 143
SPC-5 = 323	NPC-5 = 15
Non-reporting = 35	Non-reporting = 49

Figure 6-1 presents a summary of the distribution of the SPC ratings for the 2,507 buildings throughout the state reported to OSHPD as of April 19, 2001. Figure 6-2 presents a summary of the distribution of the SPC ratings for the 1,072 buildings included in this evaluation. The data are included in the Appendix, and were obtained from the

reports reviewed at OSHPD in Sacramento for this evaluation. Figures 6-1 and 6-2 indicate that the distribution of SPC ratings for the buildings in this evaluation (figure 6-2) is similar to the distribution of the SPC ratings for all of the reporting buildings in the state (figure 6-1).

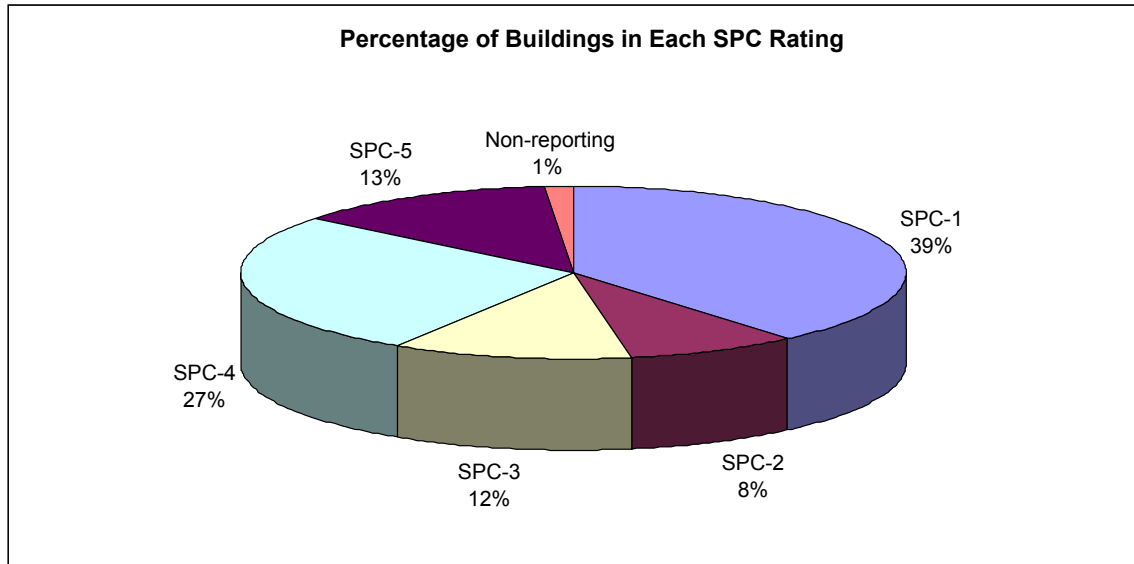


Figure 6-1 SPC Ratings for All 2,507 Buildings Reported to OSHPD as of April 19, 2001

SPC Ratings Reported by Hospitals

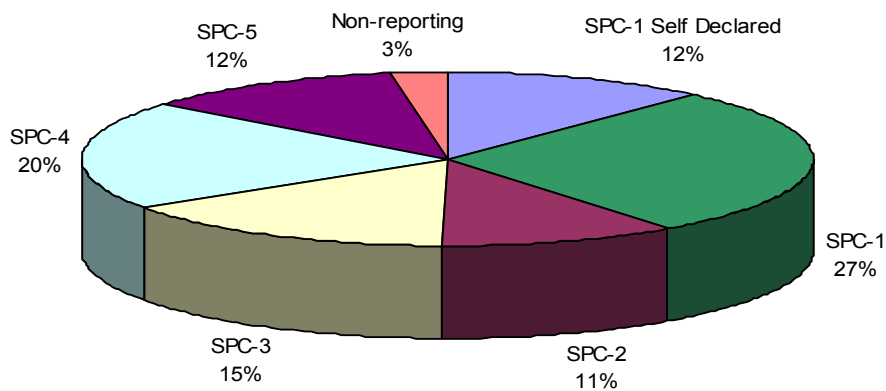


Figure 6-2 SPC Ratings for the 1,072 Buildings in this Evaluation

As is evident in the two figures, the largest proportions of buildings are either evaluated and rated as SPC-1 or self declared (without evaluation) as SPC-1, which indicates that these buildings pose a significant risk of collapse and danger to the public after a strong earthquake. The statistics show that about 40 percent of the hospital buildings in California (as well as about 40% of the hospital buildings included in this survey) are in this SPC-1 category. This raises a major concern for the functionality of California's hospitals following a major earthquake, especially if the earthquake occurs in a major metropolitan area. In addition, these hospital buildings might even contribute to the number of casualties that would need to be treated by other hospitals. Compliance with SB 1953 to either retrofit, close, or relocate these buildings by the mandated 2008 deadline will require much investment and planning. The statistics also indicate that only about half of the existing hospital buildings (at the time of the compliance report submission) were structurally conforming (either SPC-3, -4 or -5) to the requirements of SB 1953.

Figure 6-3 shows the distribution of the NPC data for the 2,507 buildings reported to OSHPD throughout the state. Figure 6-4 presents NPC ratings for the 1,072 buildings from data in Sacramento included in this survey. The comparison of the NPC ratings of the buildings for the total building sample and the limited sample in this evaluation are somewhat similar in general trend. Figure 6-3 shows that over 70 percent of the buildings were evaluated as being NPC-1 or self declared as NPC-1. The NPC-1 rating indicates that the basic nonstructural systems are inadequately anchored to resist earthquake forces. The statistics also show that almost 90 percent of the buildings had nonstructural systems that did not meet the requirements to continue operation after January 1, 2008. Only about 1 percent or less of the hospital buildings in California had "conforming" nonstructural systems (NPC-5) that would allow operations beyond the year 2030. Figures 6-1 through 6-4 strongly indicate that hospital buildings in California would perform much better with respect to the structural elements to earthquake than the nonstructural elements within those buildings. It would appear likely that although many buildings would provide adequate structural safety during and after an earthquake, many of those buildings could present significant hazard to life safety and may not be able to

provide continuing operation because of their nonconforming nonstructural systems. This information strongly suggests that a significant financial investment will be needed to upgrade or replace nonstructural systems in hospitals to be in conformance with SB 1953.

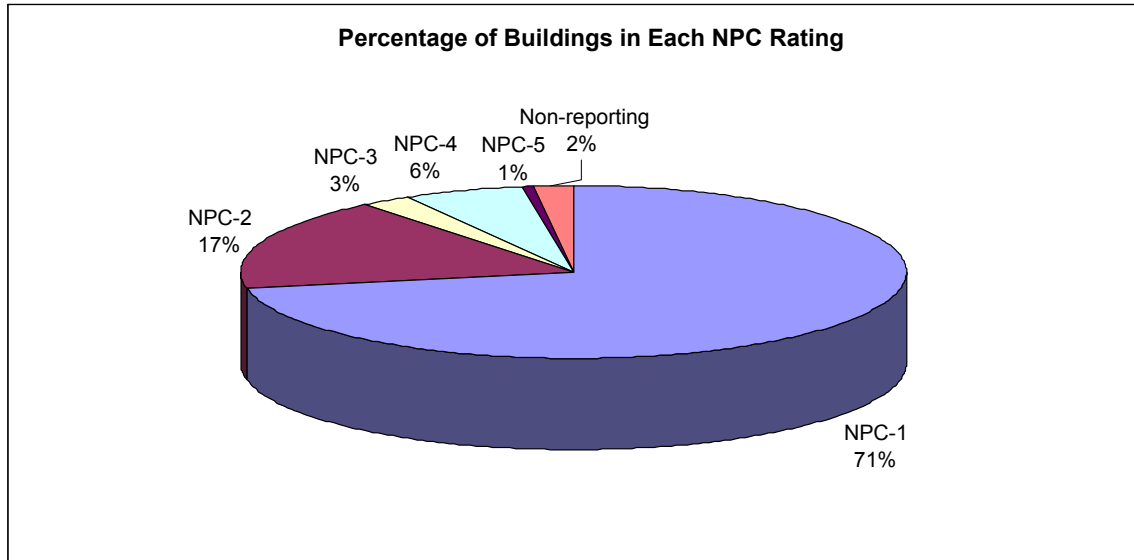


Figure 6-3 NPC Ratings for All 2,507 Buildings Reported to OSHPD as of April 19, 2001

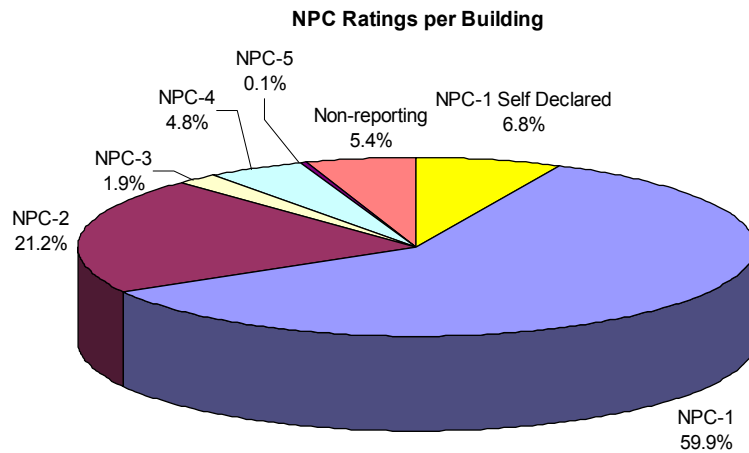


Figure 6-4 NPC Ratings for the 1,072 Buildings in this Evaluation

6.2 Observations about Structural and Nonstructural Performance Category Ratings

The degree of compliance in submitting the required SB 1953 evaluation reports of the Structural and Nonstructural Performance Categories (SPCs and NPCs) to OSHPD has been relatively high (92 percent) by the January 2001 milestone. The submitted reports indicate that about 40 percent of the hospital buildings in California are considered to pose a significant risk of collapse and a danger to the public after a strong earthquake (being rated or self-declared as SPC-1). Only about one-half of the surveyed buildings were considered to be structurally compliant (SPC-3, -4 or -5) with the requirements of SB 1953. Statewide, over 70% of the buildings were considered to have basic nonstructural systems essential to life safety and patient care inadequately anchored to resist earthquake forces (i.e., NPC-1); these inadequacies should have been corrected and upgraded to at least NPC-2 levels by January 1, 2002. Perhaps the most dramatic statistic is that only about 7 percent of the hospital buildings had nonstructural systems in compliance with current code requirements (NPC-4 or -5).

This study was able to survey and review the compliance reports for about one-third of the hospital facilities in California. Although the emphasis of the study was on the urban centers around the San Francisco Bay and in Southern California (Los Angeles to San Diego) regions, the distribution of SPC and NPC ratings between this study's dataset and the statewide dataset are very similar. It would be difficult to try to extend the conclusions drawn from the smaller database to apply across all of California. First, the counties not included in this study are, for the most part, smaller in population and more rural in character. Therefore, it would be expected that, except for counties like Sacramento and Fresno, the facilities would generally be smaller and less tall, with a larger proportion of Type I (light steel) or Type V (wood) construction. As for geotechnical properties and engineering geologic hazards, the conditions in urban areas may not be the same as in the more rural areas. However, it does appear reasonable to assume that the smaller survey does give insight into the expected behavior of the general classes of hospital facilities in urban areas.

SECTION 7 GEOTECHNICAL HAZARDS

7.1 Evaluation of Geotechnical Hazards

The available Engineering Geological Reports were reviewed and the geotechnical hazards, if identified, were noted for each hospital facility. The geotechnical hazards of interest were liquefaction, landsliding, surface faulting and tsunamis/seiches.

7.1.1 Liquefaction

The Engineering Geological Reports indicated that 30 hospital facilities out of a total of 153 facilities for which these reports were available, had some potential for liquefaction. These 30 sites are listed in tables 7-1 and 7-2, together with two sites (Kaiser-South San Francisco Medical Center in San Francisco, and Parkview Community Hospital Medical Center in Riverside, where the liquefaction hazard is not clear. It should be noted that the procedures recommended for evaluation of liquefaction (California Division of Mines and Geology, 1997) include some elements of conservatism that may indicate a higher potential for liquefaction at a site than may exist at the actual time of evaluation. For example, the guidelines for evaluation of liquefaction dictate that the historic high ground-water level be used in the analysis. The SB 1953 regulations do specify that the ground motion levels used in the analysis correspond to those expected to have a 10 percent probability of being exceeded in 50 years; this corresponds to a recurrence interval of about 474 years. Therefore, while the ground motion portion of the liquefaction analysis is probabilistic, the ground-water level for analysis is deterministic using a “worst case scenario”. For some sites, this conservative analysis may be justified as it would be difficult to predict ground-water levels during the lifetime of a structure. On the other hand, there are some sites where through urban development, the current ground-water levels are much deeper than the depths corresponding to the historic high levels. This is especially true in certain sites in the Los Angeles Basin and San Fernando Valley due to the unique character of development and ground-water management in the

region. For example, at the turn of the 20th Century, many parts of the Central Los Angeles Basin had historic high ground-water levels at or near the ground surface. Due to ground-water pumping for agriculture, and later municipal water use, ground-water levels have been lowered, often much deeper than the 50 feet normally considered in liquefaction analyses, and sometimes even deeper than 100 feet below the ground surface. However, for the purpose of analysis, the historic high ground-water level must be used for evaluation of hospital buildings under SB 1953. The rationale behind this is that future ground-water levels cannot be predicted, as there may be changes in the climate as well as in the local and regional ground-water management policies. Also, ground-water quality concerns have halted pumping for municipal water supply in some areas because of industrial and agricultural contamination. Actions such as these have in fact resulted in the rising of ground-water levels in the last few years, and they may produce additional rising of ground-water level in the future.

Statistics on the liquefaction potential for hospitals with at least one building in a respective SPC category are presented in figure 7-1. As the hospital sites typically contain a number of buildings and hence do not have a single overall SPC rating, the SPC evaluations are performed on a building-by-building basis. Figure 7-1 was created by referencing the list of hospitals with liquefaction potential and determining which hospitals had at least one building in that SPC category. By this method, a hospital site could be counted in several SPC rating categories. It should be noted that there are no hospitals in the SPC-5 rating category, as it is one of the specifications of the rating protocol that if the hospital is in a liquefiable zone, it is impossible for it to gain higher than a SPC-4 rating.

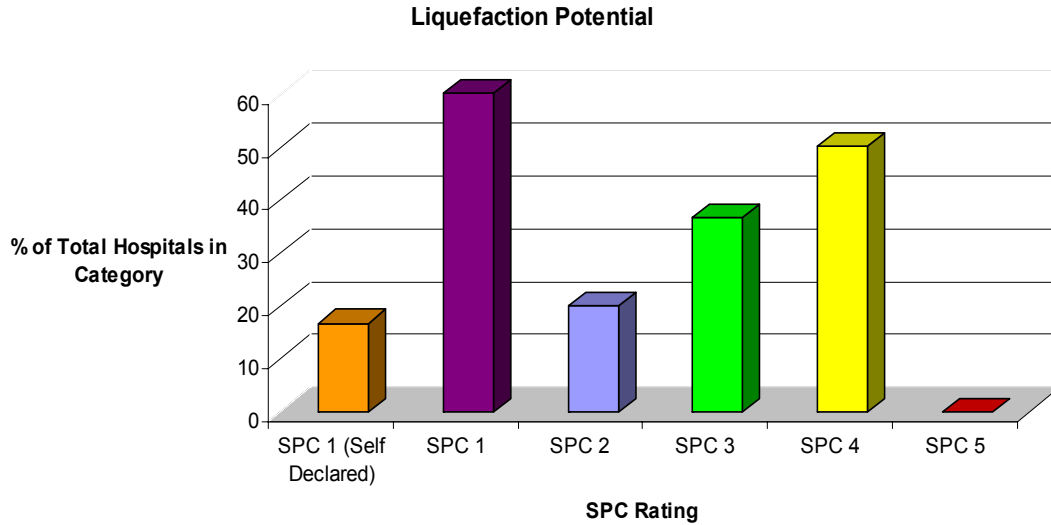


Figure 7-1 Distribution of SPC Ratings for Hospitals with an Evaluated Liquefaction Potential

Figure 7-1 indicates that within the sample of hospital facilities evaluated with a liquefaction potential, about half of the hospitals have buildings that are considered to be conforming to SB 1953 with SPC-4 rated buildings. Figure 7-1 also indicates that over one-third of the hospital facilities had conforming SPC-3 buildings. It may appear unclear, however, whether the potential for liquefaction was considered in establishing the ratings except for the clause in the regulations that “...Conforming buildings which fail this check shall be placed in SPC-4.” In a telephone discussion with Mr. John Gillengerten of OSHPD (Gillengerten, 2003), it was conveyed that the intent of the SB 1953 legislation was to correct problems with non-conforming buildings (constructed prior to 1972) and to not affect the conforming buildings constructed after 1972. It seems apparent that the SPC ratings were generally not influenced by the occurrence of liquefaction under a building, with the exception of buildings which would otherwise have been rated SPC-5, were downgraded to SPC-4. Thus, it does not appear that the structural performance evaluations took into account the possible ground settlements associated with liquefaction. It is also possible that liquefaction potential was recognized in the preconstruction phase and accounted for in the design and construction. It might therefore be expected that the structural damage in an earthquake would be more severe at some of these SPC-3 and SPC-4 rated hospital facilities because of the liquefaction-induced settlements in addition to the dynamic forces on the structural elements.

Figure 7-1 also indicates that a significant proportion of the hospital facilities with liquefaction potential have hospital buildings that are nonconforming. Nearly 60 percent of the hospitals had at least one building that was evaluated as being SPC-1, and over 15 percent of the hospitals had at least one building that was self declared as being SPC-1. Almost 20 percent of the hospitals had at least one building that was evaluated as being SPC-2. As all SPC-1 buildings are to be retrofitted or closed by the year 2008, the risks associated with the liquefaction potential compounded with the structural deficiencies may not be so great because the time window of vulnerability is relatively short. However, for hospitals that may have applied and been granted an extension of the 2008 deadline to 2013 under SB 1801 provisions, the window of vulnerability has lengthened considerably.

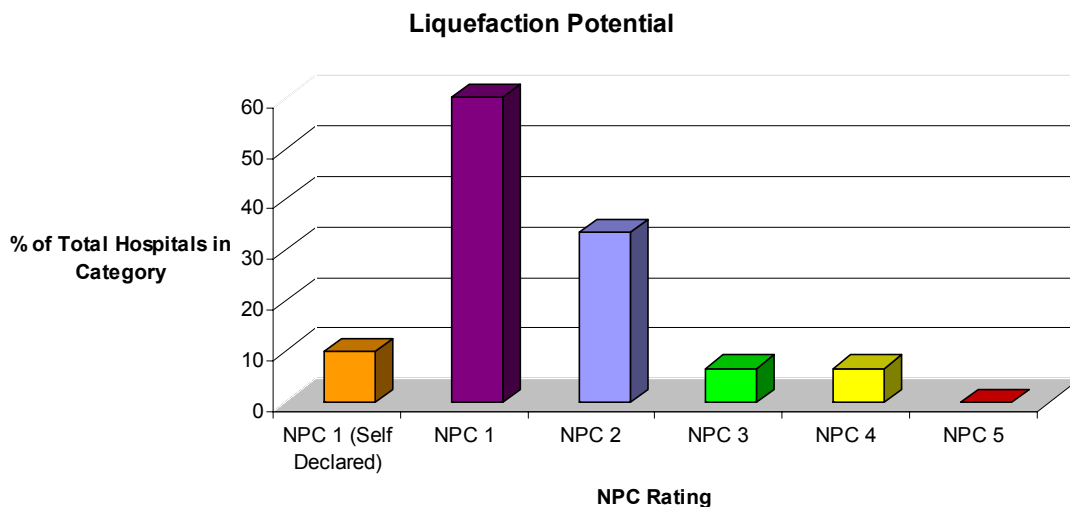


Figure 7-2 Distribution of NPC Ratings for Hospitals in this Study with an Evaluated Liquefaction Potential

Statistics on the liquefaction potential for hospitals with at least one building in a respective NPC category are presented in figure 7-2. The percentage of hospitals with nonconforming nonstructural systems (with a rating of NPC-1) in at least one building is almost 70 percent. The potential for liquefaction at these hospital facilities might suggest that the nonstructural systems would be more susceptible to damage, failure, or shut-down because liquefaction effects on the building would further impair an already fragile nonstructural system.

Table 7-1 provides a list of the hospitals in Northern California that have been identified as having the potential for liquefaction. Table 7-2 is a similar list for hospitals in Southern California. A total of 32 hospital sites are listed in these two tables; that is about 20% of the 153 hospital sites surveyed. Also noted in the tables are the estimated total and differential vertical ground settlements associated with the occurrence of liquefaction and the potential for ground lateral spreading, if applicable. It should be noted that the other 121 hospital sites surveyed, but not listed in these tables, had reports that indicated that liquefaction would not be an issue.

Table 7-1 Hospitals Identified as Having Liquefaction Potential in Northern California

County	Facility Name	Facility No.	Liq. Pot.	Total Settlement (inches)	Differential Settlement (inches)	Lateral Spread
Alameda	Alameda Hospital	11210	yes	n/a	1 to 3	Not reported
	St. Rose Hospital	11344	yes	1	Not reported	Not reported
Humboldt	Redwood Memorial Hospital	10183	yes	½ to 1	Not reported	Not reported
	Saint Joseph Hospital - Eureka	10184	yes	1 to 1¼	Not reported	Not reported
Marin	Kentfield Rehabilitation Hospital	10261	yes	2 to 3½	1½	Low
San Francisco	California Pacific Medical Center - Pacific Campus	12482	yes	n/a	Not reported	Not reported
	Kaiser- South San Francisco Medical Center	13086	low	Low	Low	Not reported
Santa Clara	Regional Medical Center of San Jose	10856	yes	2 to 4	<2	Not reported
Sonoma	Petaluma Valley Hospital	14568	yes	<0.5	Low	Not reported
	North Coast Health Care Centers-Sotoyome	11054?	yes	½ to 1	Not reported	Not reported

Table 7-2 Hospitals Identified as Having Liquefaction Potential in Southern California

County	Facility Name	Facility No.	Liq. Pot.	Total Settlement (inches)	Differential Settlement (inches)	Lateral Spread
Los Angeles	Barlow Respiratory Hospital	11417	yes	3½ to 5	2 to 2½	Not reported
	Pacific Alliance Medical Center	11646	yes	1	½	Not reported
	Providence Holy Cross Medical Ctr-Mission Hills	11726	yes	¾	low	Not reported
	Long Beach Memorial Medical Center	11846	yes	¾ to 1	<¼	Not reported
	Motion Picture and Television Fund Hospital	11887	yes	2 to 7	Not reported	Yes 1 to 4"
	Cedars Sinai Medical Center	11891	yes	¼	<¼	Not reported
	Northridge Hospital Medical Center - Roscoe Campus	11906	yes	<¼	low	Not reported
	Pacific Hospital of Long Beach	11927	yes	½ to ¾	½" in 100'	Not reported
	Sherman Oaks Hospital	12047	yes	low	low	Not reported
	West Hills Medical Center	12182	yes	n/a	Not reported	Not reported
	Martin Luther King, Jr./Charles R. Drew Medical Center	12259	yes	2	1½	Not reported
	Suburban Medical Center	12787	yes	2½	½" in 100'	Not reported
	Kaiser- West Los Angeles	12875	yes	0.4 to 2.4	Not reported	none
	Greater El Monte Community Hosp.	13224	yes	¾	½" in 100'	Not reported

Table 7-2 Hospitals Identified as Having Liquefaction Potential in Southern California (cont'd)

County	Facility Name	Facility No.	Liq. Pot.	Total Settlement (inches)	Differential Settlement (inches)	Lateral Spread
Orange	Los Alamitos Medical Center	10440	yes	1¾	1 inch in 100 ft.	Not reported
	Vencor Hospital - Orange County	10476	yes	1.55 to 2.76	1	Not reported
	Fountain Valley Regional Hospital	12834	yes	1 to 2	1 to 1½	Not reported
	Vencor Hospital - Brea (a.k.a. Kindred Hospital - Brea)	13068	yes	<¾	low	Not reported
	Kaiser Foundation Hospital - Anaheim	13078	yes	2	1	low
Riverside	Parkview Community Hospital Medical Center	10554	<0.25	low	low	Not reported
San Diego	Alvarado Hospital Medical Center	12872	yes	low	low	Not reported
Ventura	Community Memorial Hospital	11159	yes	4 to 22	Not reported	Not reported

Figure 7-3 shows the proportion of hospital facilities in this study having an identified potential for liquefaction. Figure 7-4 shows the number of hospitals reporting with an expected total liquefaction vertical ground settlement. The number of hospitals reporting an expected differential liquefaction settlement are presented in figure 7-5.

As shown in figure 7-4, almost 20 percent of the engineering geologic reports for the hospitals reporting that there was a potential for liquefaction at the facility did not report the expected liquefaction-induced vertical settlement. It is anticipated that these reports will not receive OSHPD approval until the settlement is provided; however, it is expected that the liquefaction-induced settlement will be small (i.e., less than one inch). About 30 percent of the hospital facilities, while having some potential for liquefaction, reported that the total liquefaction settlement would be 1 inch or less. If the hospitals not reporting a total settlement were indeed having a small settlement, it is possible that about half of the hospitals with potential for liquefaction may be subject to a maximum

total settlement of 1 inch or less. It may not be expected that settlements of this order of magnitude should provide a great concern for life safety or structural stability by themselves; however, these settlements may exacerbate other structural or nonstructural deficiencies in the buildings. About 16 percent of the hospitals potentially vulnerable to liquefaction reported maximum settlements of 1 to 2 inches and about 23 percent reported maximum settlements of 2 to 4 inches. It should be noted that these results are more qualitative than quantitative given the estimating nature of many geotechnical calculations. Structural damage may occur with these magnitudes of settlements, particularly if the differential settlements are also large. Almost 10 percent of the hospitals reporting liquefaction potential would have maximum settlements greater than 4 inches; in these cases, both structural and nonstructural performance would be expected to be greatly impacted. More specifically, sites such as Barlow Respiratory Hospital in Los Angeles County, with up to 5 inches of total settlement, may have major damage due to liquefaction settlement. For Community Memorial Hospital in Ventura County, with up to 22 inches of total potential liquefaction settlement, great structural and nonstructural problems would be expected if the liquefaction potential is not mitigated; there would also be a potential problem with essential underground utility services, such as electricity, gas, water, and sewer, that connect to the hospital buildings.

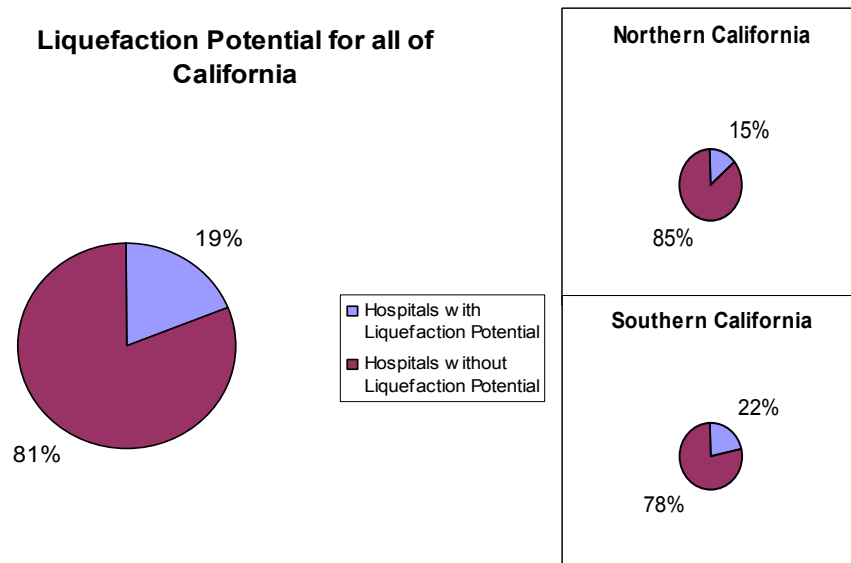


Figure 7-3 Distribution of Hospitals with Evaluated Liquefaction Potential for the Reports Reviewed in this Report

Estimated Total Liquefaction Settlement in Hospitals Reporting Liquefaction Potential

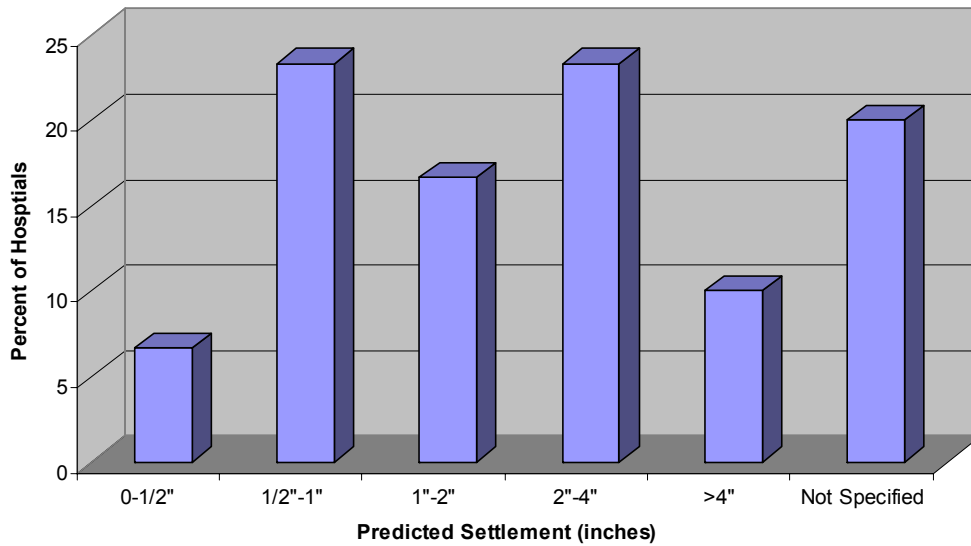


Figure 7-4 Estimated Total Settlement Due to Liquefaction Reported in Hospitals Reporting Liquefaction Potential Surveyed for this Study

Estimated Differential Settlement in Hospitals Reporting Liquefaction Potential

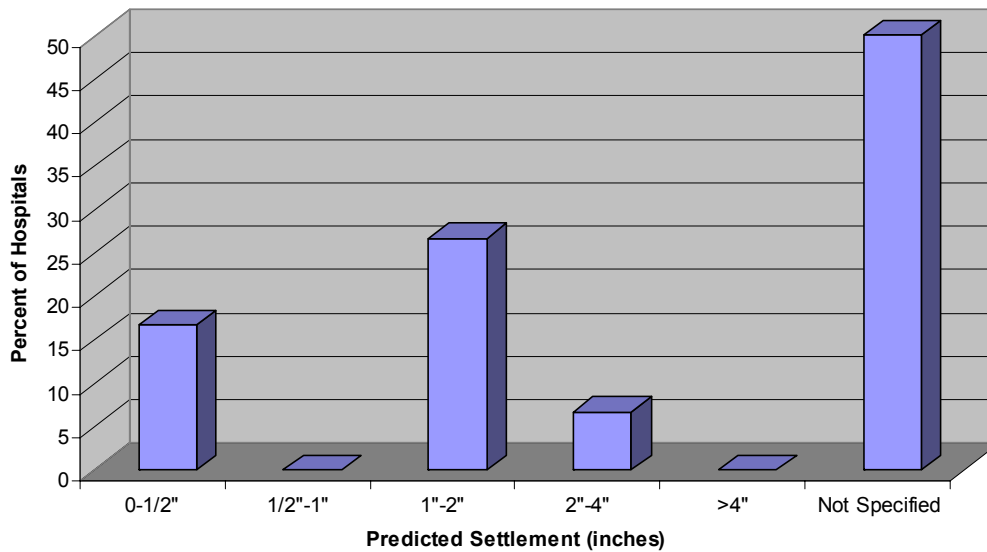


Figure 7-5 Estimated Differential Settlement Due to Liquefaction in Hospitals Reporting Liquefaction Potential in this Study

Lateral spreading due to liquefaction was reported as “not applicable” at most facilities. In Northern California, Kentfield Rehabilitation Hospital in Marin County reported the potential for lateral spreading as “low”. In Southern California, Kaiser Permanente Hospital in Anaheim (Orange County) also reported the potential for lateral spreading as “low”. The Motion Picture and Television Fund Hospital in Los Angeles County reported lateral spreading potential on the order of 1 to 4 inches. It can be deduced from this that, in general, liquefaction-induced lateral spreading does not seem to be a major concern for California hospitals.

7.1.2 Landsliding

Hospitals with a landslide potential are listed in table 7-3. Only three hospitals had reported a landslide potential in the Engineering Geologic Reports available to us for review in Sacramento. All three of the hospitals were in Marin County, in the north San Francisco Bay Area.

Table 7-3 Hospitals That Have Identified Landsliding Potential

County	Facility Name	Fac. No.	Landslide Potential	Notes
Marin	Marin General Hospital	10273	yes	due to falling rocks
	Kaiser Permanente San Rafael Medical Center	10268	yes	None
	Kentfield Rehabilitation Hospital	10261	yes	low due to improvements

7.1.3 Surface Faulting Potential

Only one hospital had reported a potential for surface faulting as of the time of our review of the SB 1953 Compliance Reports in Sacramento. That hospital was the UCLA Santa Monica Hospital in Los Angeles County. The hospital is not within a currently established Alquist-Priolo Earthquake Fault Zone where a fault rupture evaluation would be required for new construction. However, the active Santa Monica Fault is believed to underlie the UCLA Santa Monica Hospital at depth, but may not extend to the ground surface. The location of the fault is difficult to determine from the surface as massive

urban development has eradicated many of the tell-tale signs of a fault trace. Branches of the fault have been located in the subsurface by borings as the fault is a ground water barrier. Until recently, the Santa Monica Fault was only considered to be potentially active, but is now believed to be active in the current Holocene age. The City of Santa Monica does require that the Santa Monica Fault be investigated for new developments.

7.1.4 Tsunami and Seiche Potential

Although not specifically mentioned by the SB 1953 regulations, the State of California’s draft guidelines on “Engineering Geology and Seismology for Public Schools and Hospitals in California” (Sydnor, 2004) requires an evaluation for tsunamis if a site is near the California coastline. Similarly, the guidelines call for an evaluation for the potential of seiches if the site is near the shoreline of a large body of water, such as a lake or reservoir. The hospitals that reported potential for tsunamis or seiches are presented in table 7-4.

Table 7-4 Hospitals That Have Identified Potential for Tsunamis/Seiches

County	Facility Name	Fac. No.	Tsunamis/Seiches
Contra Costa	Doctors Medical Center Pinole	10055	Yes
Marin	Marin General Hospital	10273	Yes
Los Angeles	City of Hope National Medical Center	11527	Yes
San Diego	Alvarado Hospital Medical Center	12872	Yes

The four hospitals found in table 7-4 all responded positively to a potential of tsunamis/seiches. Upon further investigation into the sites of each of the listed hospitals, it became apparent that the potential was not due to tsunamis, but due to seiches in all cases. The Doctors Medical Center in Pinole is located adjacent to the Maloney Reservoir whereas Marin General Hospital in Marin is near the Corte Madera Channel. City of Hope National Medical Center in Duarte is close to the Santa Fe Dam and Alvarado Hospital Medical Center in San Diego is near the Murray Reservoir. All of these were the reasons for the reported potential for seiches at these facilities.

7.2 Observations about Geotechnical Hazards Affecting Hospitals

From a geotechnical perspective, it appears that – second only to strong ground shaking – liquefaction is the most common seismic hazard affecting hospital buildings in California. About 19 percent of the hospitals sampled in both Northern and Southern California were evaluated as having a potential for liquefaction. The percentage was slightly lower in the north than in the south. Some of the reporting hospitals indicated a potential for liquefaction, but did not state an estimate of the liquefaction-induced vertical ground settlement. If it is assumed that these settlements are generally small, say less than 1 inch, it is possible that about one-half of the hospitals with potential for liquefaction would be subject to 1 inch or less of liquefaction-induced settlement. As the differential settlements between adjacent structural elements would be less, these hospital buildings may not be structurally affected unless the structures have some severe inherent deficiencies. Vulnerable nonconforming nonstructural systems could also be adversely affected.

The other half of the hospitals reporting liquefaction potential were subject to liquefaction vertical ground settlement on the order of 1 inch or more. About one-third of the hospitals reporting liquefaction potential were subject to liquefaction settlement on the order of 2 inches or more. Just under one-tenth of the hospitals reporting liquefaction potential were subject to liquefaction settlement of 4 inches or greater. With increasing settlement, structural damage would be expected to increase. Larger settlements of 2 inches or more may cause the structures to become nonfunctional. With even larger settlements of 4 inches or greater, structural damage would be severe with possible collapse in nonconforming buildings.

The few hospitals in the study reporting total liquefaction settlements larger than 4 inches would perhaps indicate that extreme liquefaction would be rare at hospital sites in California. An examination of the conditions at the three sites reporting such large liquefaction settlements would be useful. Two of the sites were in Los Angeles County,

namely Barlow Respiratory Hospital and Motion Picture and Television Fund Hospital, and the third was the Ventura Community Memorial Hospital in Ventura County.

The Barlow facility is located in a small isolated valley that has relatively little development in the Elysian Hills near Elysian Park, north of downtown Los Angeles. The valley is filled with alluvium over sedimentary rock and the ground-water level is shallow in the alluvium. Because of the shape of the narrow valley and the locations of the buildings at the hospital being spread out, the estimated liquefaction settlement does vary. However, the Barlow site is unique in its setting, partly because of its role as a respiratory hospital in a less populated area, and also because the site is not typical of other hospital sites in the general Southern California area.

The Motion Picture and Television Fund Hospital is located on the southwestern edge of the San Fernando Valley. The facility lies in a small valley at the northern base of the Santa Monica Mountains and there are seasonal streams near the site. The facility is underlain by Holocene age alluvium which contains some layers of very loose to medium dense silty sand and sand. Siltstone bedrock underlies the alluvium at depths between about 35 to 55 feet. The ground water is fairly shallow, located at a depth of about 10 to 15 feet below the ground surface. The site conditions at the Motion Picture and Television Fund Hospital are also unique, like Barlow, and not typical of other sites in the general area.

The Ventura Community Memorial Hospital is located on the Ventura-Oxnard Plain in Ventura County, west of Los Angeles County. The hospital is underlain by deep Holocene age alluvial deposits (to depths between 90 to 100 feet) that contain loose to medium dense deposits of sand and soft to medium stiff silts. Ground-water levels in the region have varied considerably from 27 to 95 feet below the ground surface in the period from 1983 to 1999. However, the ground-water level has been steady rising since 1991 when the ground-water level reached its deepest elevation. In 2002, the ground water was measured in borings to be at a depth of about 40 feet. There is also evidence that there could be perched water on some shallower impervious layers that are between 15 and 20

feet below the ground surface. Evaluation of these conditions have led to the conclusion that there is a very significant liquefaction potential at the Community Memorial Hospital site, and that large liquefaction ground vertical settlement is possible if the ground water were to reach the highest estimated levels.

The conditions encountered at the Community Memorial Hospital may not be unique as the Ventura-Oxnard plain extends over a large area. Furthermore, virtually all this very geologically young Holocene age plain with relatively shallow ground water has been determined to be within a Liquefaction Hazard Zone, in accordance with the Seismic Hazards Mapping Program administered by the California Division of Mines and Geology (now known as the California Geological Survey (CDMG, 2002a, 2002b, 2002c and CGS, 2003)). It should be expected that other hospitals located within the Ventura-Oxnard plain may have a similar high liquefaction potential.

The hospitals in this study did not indicate that landsliding was a major concern except for three hospitals in Marin County. The terrain in Marin County has much more relief than in the other counties surrounding San Francisco Bay which may explain why all of the hospitals with landsliding potential were found in this county. Also, Marin County is much more rural. These results suggest that on a statewide basis, there may be more hospitals with landsliding potential since this study did not investigate facilities in counties that are less urban and more rural.

Only one hospital in this survey indicated that the facility had a fault rupture hazard. The UCLA Santa Monica Hospital is located in densely populated and highly developed Santa Monica, California, and a branch of the Santa Monica fault passes through the facility. The original hospital was constructed at the time when a fault study was not required. To our knowledge, there may be several other hospitals in California where known faults may cross the facilities. For example, the State of California recently established a new Alquist-Priolo Earthquake Fault Zone for the Simi Fault, and the Simi Valley Hospital campus in Ventura County is within this zone.

SECTION 8 OCCURRENCES OF LIQUEFACTION AT HOSPITALS IN PAST EARTHQUAKES

Remarkably, there is almost no documentation of liquefaction occurrence at hospital facilities during recent earthquakes in California such as the 1971 San Fernando, 1989 Loma Prieta, and 1994 Northridge earthquakes. It is the considered opinion of the authors that this lack of documentation is not due to the lack of liquefaction effects, but rather to those liquefaction effects being either moderate or overlooked and hence not reported.



Figure 8-1 Liquefaction-Induced Settlement of Slab on Grade Adjacent to Pile-Supported Hospital Building in Woodland Hills from the Northridge Earthquake

From limited direct observations by the first author and verbal reports after the Northridge earthquake, there is in fact specific evidence that liquefaction did occur at some hospitals. Figure 8-1 shows settlement of concrete slabs on grade adjacent to a pile-supported hospital building in the Woodland Hills District of the City of Los Angeles in the San Fernando Valley. Settlements of the slabs adjacent to buildings were

on the order of 1 to 2 inches. There was no evidence of sand boils or other surface manifestations from the first author's observations at the facility. The only exception may have been ground oscillation due to liquefaction at the Woodland Hills site that caused minor distress in the concrete street curb as shown in figure 8-2.



Figure 8-2 Minor Distress of Concrete Street Curb Due to Possible Ground Oscillation

In addition to the observations at the Woodland Hills hospital facility following the Northridge earthquake, there was evidence of liquefaction at another hospital facility in the Northridge District in the San Fernando Valley. There were reports of distress to floor slabs established directly on grade. Investigations of the slabs on grade indicated that there were 1- to 4-inch voids beneath the slabs. In addition, evidence of ground settlement on the order of several inches could be seen on the exterior of the buildings as shown in figure 8-3.



Figure 8-3 Liquefaction-Induced Settlement of On-Grade Structures Relative to Pile-Supported Hospital Building in Northridge District of Los Angeles

Another possibility exists that liquefaction during the 1994 Northridge earthquake just did not occur as much as would be expected from the SB 1953 evaluations. One contributing factor would be that the strongest ground motions occurred in 1994 primarily in the Northern San Fernando Valley and in the Simi and Santa Clarita Valleys, and not in the more populous areas of Los Angeles to the south, thus affecting fewer hospitals. A second contributing factor would be the ground-water levels at the time of the earthquake. In many areas, the prevailing ground-water levels were deeper, sometimes much deeper, than the historic high ground-water levels used for SB 1953 evaluations. Since a deeper ground-water level decreases the potential for liquefaction, it would not be surprising if the actual occurrence of liquefaction in past earthquakes had been less than predicted by the SB 1953 evaluations.

However, in this respect it is important to note that there is a general trend in Southern California for ground-water levels to rise due to ground-water recharging programs and

decrease in pumping of ground water for municipal water supply. As a result, the actual liquefaction potential may have increased since 1994 and may continue to increase in the future, compared to the liquefaction potential at the time of the 1994 Northridge earthquake.

SECTION 9 CONCLUSIONS

This study evaluated the Engineering Geological Reports submitted as part of the compliance requirements of SB 1953 to make California hospitals more likely to maintain uninterrupted operations following major earthquakes. The initial SPC evaluations reported in 2001 showed that less than half of the hospital buildings were structurally compliant. Almost 40 percent of the hospital buildings were determined to have significant risk for collapse and would be a danger to public safety in the event of a strong earthquake; these buildings would need to be retrofitted or vacated by 2008, although a 5 year extension could be granted upon application. When considering nonstructural NPC performance, prior to 2001 over 70 percent of the hospital buildings had basic nonstructural systems essential to life safety and patient care that were inadequately anchored to resist earthquake forces. About 99 percent of the buildings would require upgrading or replacement of the nonstructural systems to meet the 2030 requirements for full compliance with SB 1953.

It was originally intended to review and digest information for this report, from a survey of mostly urban 248 site facilities, or about half of the 470 acute care hospital facilities in California. The planned 248 facilities were located in two geographical regions: in Northern California as defined by the predominantly urban counties around San Francisco Bay; and in Southern California as defined by the predominantly urban counties of Los Angeles, Orange and San Diego. When it became apparent that OSHPD did not have all of the reports available from these targeted counties, it was decided to expand the geographical base of the study to include more counties. The total number of hospital facilities finally surveyed and which had submitted structural reports were 186 sites of which 153 sites has also submitted geotechnical reports. These 153 sites, about one-third of the total number of sites in the state, constitute the sample which served as the basis for the conclusions on liquefaction and other geotechnical hazards in this report.

From this study of the SB 1953 reports, it was determined that the most prevalent engineering geologic hazard affecting hospitals in California is liquefaction. A total of

32 hospital sites, or about 20 percent of the total number of sites surveyed, indicated a potential for liquefaction in the event of the design earthquake ground motions per SB 1953. Most of these facilities either did not address the possibility of lateral spreading or rated a low hazard of this type. Most of the reports gave estimates of the post-liquefaction vertical ground settlements. Perhaps up to half of these hospital facilities indicated that they would experience a total settlement of one inch or less. The expected structural damage from this relatively small magnitude of settlement should be relatively minimal; however, for the many noncompliant and thus more vulnerable structural systems, more damage could occur because of additional foundation movement. Only a small number of hospitals (three sites) reported large (> 4 inches) liquefaction-induced total settlement. They are the Barlow Respiratory Hospital and the Motion Picture and Television Fund Hospital, both in Los Angeles, and the Community Memorial Hospital in Ventura County. The local site conditions at the two Los Angeles sites are restricted to a limited area and hence they are not indicative of other hospitals not surveyed in the region. On the other hand, the third site in Ventura County may be more typical of the entire Ventura-Oxnard Plain, strongly suggesting that other facilities in the region which were not surveyed may perhaps have similar liquefaction potential.

One important aspect of the SB 1953 geotechnical liquefaction evaluations is that they are required to use historic high ground-water levels. This may be conservative in many sites where the ground-water levels are now deeper due to pumping. Therefore, probably the actual current liquefaction potential, for the SB 1953 design earthquake, at the sample of hospital sites surveyed is somewhat less than 20% of the sites as concluded above. In this respect it would be useful have a comprehensive picture of what actually happened at hospital sites in California in recent earthquakes. However, this is not easy as most liquefaction occurrence at hospital sites is generally not reported or otherwise documented. As an example, this report reviewed cases of hospital sites known to the first author to have liquefied in the 1994 Northridge earthquake, which went unreported. It is speculated, however, that those instances of liquefaction in the 1994 Northridge earthquake affected less than 20% of the sites due to the depressed ground-water levels. In this respect, it is important to note that there is a general trend in Southern California

for ground-water levels to rise due to ground-water recharging programs and decrease in pumping of ground water for municipal water supply. As a result, the actual liquefaction potential may have already increased since 1994 and may continue to increase in the future, compared to the liquefaction potential at the time of the 1994 Northridge earthquake.

Only three sites reported a landsliding hazard in the study sample, all in Marin County. Marin County is more rural and has stronger topographic relief than the other counties studied. This may indicate that there would be more facilities with landsliding potential in the more rural and more topographically rugged counties of the state that were not surveyed.

Only one hospital site reported surface fault rupture potential. There are probably other hospital sites within known Earthquake Fault Zones that may require more study. There is also the possibility that as the State of California adds additional Earthquake Fault Zones, more hospital sites may be affected.

As mentioned earlier, the sample surveyed consisted of 153 sites for which geotechnical reports were available, or about one-third of the total number of sites in the state. This raises the question on how representative this one-third sample is for evaluating the total geotechnical hazard in both urban areas and in the whole state. A comparison between the SPC and NPC rating statistics included in the sample, with the overall SPC and NPC statistics for the whole state, indicated that the two sets of statistics are very similar. This is not inconsistent with a preliminary conclusion that, in an overall statistical sense, the results about geotechnical hazards, and most specifically liquefaction, obtained from this one-third sample presented below, may well be applicable to the whole state. Given the overwhelming urban character of the counties surveyed in the study, these statistical results are certainly valid for the main urban areas in the State of California. On the other hand, the landsliding hazard, which was restricted to Marin County in our sample, may generally be restricted to similarly rural and topographically rugged counties in the state.

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APPENDIX

This appendix includes tables for each county investigated in our research. The tables present the SPC rating per building of each hospital. The information was obtained from reports found in OSHPD's office in Sacramento, California. The facility number was given by OSHPD and can be used to reference the hospitals in the other tables included in the body of this report. The building use and/or name has also been included next to its respective SPC rating. Also the building number as was assigned by each hospital in their reports has been included for another point of reference. Graphical representation of this data may also be found in the main body of the report.

Northern California Counties

Table A-1 SPC Ratings by Building – Alameda County

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
11210	Alameda Hospital	1	NA	Original Hospital
		2	2	Stephens Wing
		3	2	West Wing
		4	3	South Wing
		5	5	Radiology Addition
		6	3	Medical Gas Storage
		7	3	Emergency Room Relocation
		8	4	Compactor Shed
11214	Alta Bates Medical Center - Ashby Campus	1	2	Admin Bldg
		2	2	Laundry/Hall of Health Bldg
		3	2	Boiler Bldg
		4	2	1968 Bldg/Southwest Bldg
		5	2	1975 North Bldg
		6	4	1985 Bldg
		7	4	Electric Service Bldg
		8	4	Oxygen Tank Enclosure
11285	Alta Bates Medical Center - Herrick Campus	1	3	1980 Patient Care & Link
		2	5	Saleck Cancer Center
11242	Children's Hospital Oakland	1	5	Cardiac Catherization Lab
		2	3	Patient tower
		3	3	West Site Plant
		4	3	Cafeteria Addition
		5	3	Diagnostic & Treatment Bldg
		6	1	B/C Wing
		7	1	A/B Wing & A/B Wing Lobby Addition
11260	Eden Medical Center	1	1	1951 Main Bldg
11321	Kindred Hospital - San Francisco Bay Area (Vencor - San Leandro)	1	1	Bldg I (Orig. Bldg + 1 story Surgery Addition)
				Bldg II (1 story outpatient, 1 story remodel "A Wing")
		2	5	
		3	4	Boiler Enclosure
			2	Generator/Cooling Tower
	2	Oxygen Tank Enclosure		
11256	San Leandro Hospital	1	3	Main Building

Table A-1 SPC Ratings by Building – Alameda County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
11344	St. Rose Hospital	1	1	Main Hosp. Bldg
		1a	1	Engineering/Boiler Bldg
		4	3	Emergency & Critical Care
		8	4	Chiller/Generator Bldg
11322	Summit Medical Center - North Pavilion	1	1	Ehmann Bldg
		2	2	North Wing
		3	3	South Wing
		4	1	East Wing
		5 & 5a	1	Original West Wing/Tower Addition
		6 & 6a	1	West Service Wing & Tower Addition
		7	2	Physiotherapy Bldg
		8	2	Original Emergency Wing
		9	3	Special Procedures Addition
		10	5	E.D. Expansion
		11	4	Cogeneration Bldg
		12	4	Emergency Generator
		13	1 (self declared)	Transformer Bldg
11338	Summit Medical Center - South Pavilion	14	3	South Pav. Main Hosp. Bldg
11366	Washington Hospital	1	2	Original Hospital Bldg
		2	2	South Wing Addition
		3	bldg =2; emergency entrance canopy = 3	Emergency Wing Addition
		4	2	Areas No. 1 & 2 Addition
		5	2	Area No. 3 Addition
		6	2	Area No. 4 Addition
		7	2	Area No. 5 Addition
		8	5	Entrance Canopy
		9	2	Whitaker Pavilion

Table A-2 SPC Ratings by Building – Contra Costa County

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
10055	Doctors Medical Center Pinole	1	1	Main Hospital Bldg
		2	4	ICU/CCU Addition
		3	4	Cath Lab Addition
		4	3	Entrance Lobby addition
		5	4	West Wing and Emergency Services Addition
		6	4	East Wing Addition
10038	Doctors Medical Center San Pablo	1	1	Main Bldg/Dining Room/Corridor
		2	2	Boiler Room/Additions
		3	2	Laboratory
		4	3	Southwest Addition/Cobalt Therapy
		5	3	East Addition
		6	3	Generator Bldg
		7	5	West Wing Addition
10081	John Muir Medical Center	1	1	Phase 1: Orig. Hospital (Tower & Low Rise)
		2.1	2	Phase 2 Tower
		2.2	2	Phase 2 Cafeteria/Cardiology
		2.3	2	Phase 2 ER/Radiology
		3	3	Phase 3 West Wing
		4	Exempt	Yosemite Medical Office Bldg
		5	3	MRI Addition
		6	Exempt	Service Bldg/Shop
		7	3	E.R. Addition
		8.1	Exempt	Tuolunme Center
		8.2	Exempt	Tuolunme Center
		8.3	Exempt	Tuolunme Center
		9	Exempt	Medical Office Bldg
		10	Exempt	Medical Office Bldg
11	Exempt	Linear Accelerator		

Table A-2 SPC Ratings by Building – Contra Costa County (cont'd)

Fac. No	Hospital Name	Bldg No.	SPC Rating	Building Use
10048	Mt. Diablo Medical Center	1	1	Original Hospital
		2	2	"C" Wing
		2.1	1	Elevator/Stair Tower
		2.2	1	"C" Wing (East Wing) North West Element
		3	1	"D" Wing
		3.1	2	"D" Wing (North Wing) Infill
		4	2	"C" Wing Addition
		5	4	Linear Accelerator
		6	2	"B" Wing
		7	5	Surgery Equipment Room
		8.1	5	Cancer Center
		8.2	3	Emergency Room
		8.3	3	Canopy
		9	3	"A" Wing
		10	Exempt	MRI
11	5	Linear Accelerator		
12	4	Central Plant		
13	2	Boiler Plant		
14	Exempt	Medical Office Bldg		
15	Exempt	Medical Office Bldg		

Table A-3 SPC Ratings by Building – Marin County

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
10268	Kaiser Permanente Medical Center, San Rafael	1	1	General Services Bldg
		2	2	Hospital Bldg
		3	2	Medical Office Bldg 1
		4	2	Mechanical Equip Bldg
		5	5	Support Services
		6	5	Generator Switchgear Bldg
10261	Kentfield Rehabilitation Hospital	-	1	Rehabilitation
10273	Marin General Hospital	1	2	Hospital
		2	2	2 Story Addition
		3	2	Cobalt Bomb wing
		4	1	Laboratory Additions
		5	1	Pedestrian Bridge
		6	3	West wing
		7	1	4 story addition
		8	2	Medical Records/Radiology Revision
		9	5	East Canopy
		10	5	West Canopy

Table A-4 SPC Ratings by Building – San Francisco County

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
12421	California Pacific Medical Center - California East Campus	1	1	East Campus North Wing
		2	1	East Campus South Wing
		3	5	Center for Geriatrics Parking
12404	California Pacific Medical Center - California West Campus	1	1	West Campus - East Wing
		2	2	West Campus - Bldg "B"
		3	3	West Campus - Bldg "H"
		4	1	West Campus - Bldg "A"
		5	3	West Campus - "NBICU" Bldg
		6	Exempt	Outpatient Research Bldg
		7	2	North Wing Bed Tower
		8	1	Boiler Room
12482	California Pacific Medical Center - Pacific Campus	1	1	Main Hospital
12416	Davies Medical Center	1964 North Tower	1	
		Link Bldg	1	
		South Tower	1	
		1969 Rehab Bldg	1	
		1991 ER Services Addn	4	
		1995 MER Bldg	3 or 4	
12457	Saint Francis Memorial Hospital	1	2	1958 Building
12430	San Francisco Geary Medical Center	1	4	Main Hospital
		2	2	East Wing
		3	4	North Wing
		4	4	MEE Bldg
		5	2	Doctor's Sleep Annex

Table A-4 SPC Ratings by Building – San Francisco County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
12463	San Francisco General Hospital	1	1	Main Hospital
		2	1	M Wing
		3	1	Service Building
12459	St. Luke's Hospital-San Francisco	1	2	1957 Wing
		2	1	Main Building
12460	St. Mary's Medical Center	1	1	Main Tower
		2	1	McAuley Wing
		3	1	South Wing
		4	1	South Wing Corridor
12443	University of California, San Francisco Medical Center - Mount Zion	A	2	Acute care
		B	1	Acute care
		D	1	Mechanical, central supply
		R	4	
12476	University of California, San Francisco Medical Center	1	2	Moffitt Hospital
		2	4	Long Hospital
		3	3	Emergency Entrance Structure
		4	4	Magnetic Resonance Imaging Building
		5	4	Central Utilities Plant

Table A-5 SPC Ratings by Building – San Mateo County

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
10801	Catholic Healthcare West Seton Medical Center	1	1	1963 Tower
		2	1	Front Wing
		3	3	Area A & B
		4	3	Area C
		5	3	Area D
		6	3	Center Pod
		7	3	South Pod
		8	4	Utilities Service Bldg
13086	Kaiser Permanente Medical Center South San Francisco	1	2	Acute care
		2	2	Acute care
		3	3	Hospital Tower
		4	2	Acute care
		5	2	Acute care
		6	2	Acute care
		7	3	Acute care
		8	3	Acute care
		9	3	Acute care
10810	San Mateo County Health Center	3	5	Central Plant
		4	5	Nursing Wing
		5	5	Nursing Wing link
		6	5	North Addition
		8	5	Diagnostic & Treatment Center
10811	Sequoia Hospital	1	1 (self declared)	Dietary Serv, Psychiatric Serv, cardiac step-down unit, nursery, NICU
		2	1 (self declared)	md rec, lobby, shop, med/sur overflow, dialysis, wound care, telemetry, deliv, mech/elec serv
		3	1	pain treat cntr, admin, telemetry, med/surg unit
		4	2	radiation ther, mech/elec, rehab serv
		5	1 (self declared)	med recs/payroll, lab, offices, rehab services, telemetry, nuclear med, med/surg unit
		(6, 8, 9 & 10)	1 (self declared)	central plant, biomed eng, boiler, morgue, lndry, rehab, radiology, ER, surg, ICU, deliv.
		7	2	offices, clinical lab, post anesth., cardiac rehab

Table A-6 SPC Ratings by Building – Santa Clara County

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
10919	Catholic Healthcare West, O'Connor Hospital	1	1 (self declared)	1953 Building
		2	1 (self declared)	1953 Boiler House/Laundry
		3	1	1969 Addition
		4	4	Replacement Facility
		5	4	Replacement Boiler House
10890	Columbia Good Samaritan Hospital	1	2	Main/Addition
		2	3	MRI Bldg
10874	Community Hospital of Los Gatos	1	1 (self declared)	Original Bldg/Outpatient Surgery
		2	1	Generator Room
		3	1 (self declared)	Unit Two Bldg/CCU bldg
		4	2	Surgery/Medical Conference Cntr
		5	1 (self declared)	Admin Bldg
		6	2	ICU Bldg
		7	4	ER
		8	5	Endoscopy
		9	5	Entry Canopy
		10	1 (self declared)	OB-Gyn/Cancer Cntr
10883	El Camino Hospital	1	3	Orchard Pavilion
		2	3	Willow Pavilion
		3	exempt	Oak Pavilion
		4	3	Laundry & Lab Addition
		5	1	Unit A Expansion
		6	5	Compactor Addition
		7	2	North Addition
		8	3	Surgical Wing
		9	1	Original Hospital
		10	3	Central Plant
		11 & 12	1	Psychiatric Wings
		13a	2	South Addition
		14	2	South Addition
15	1	East Addition		
16	exempt	Park Pavilion		
12952	Kaiser Permanente Medical Center - Santa Teresa	1	2	Hospital
10878	Mission Oaks Hospital	1	3	Main Bldg

Table A-6. SPC Ratings by Building – Santa Clara County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
10856	Regional Medical Center of San Jose	1	1	Main Tower and North Wing
		2	1	South Wing
		3	1	Obstetrics Wing
		4	4	Emergency Dept. Bldg
		5	3	Lab Bldg
		6	3	Surgery Bldg
		7	3	ICU/CCU Bldg
10932	San Jose Medical Center	1	1	
		2A	1 (self declared)	
		2B	1 (self declared)	
		3A	1 (self declared)	
		3B	1 (self declared)	
		3C	1 (self declared)	
		3D	1 (self declared)	
		4	1 (self declared)	
		5	1	
		6A	3	connecting bridge between bldgs 5 & 6
		6B	3	connecting bridge between bldgs 5 & 6
		6C	3	lobby area of radiology bldg
		6D	3	Radiology Bldg
		7	1	Emergency Generator
10935	Santa Clara Valley Medical Center	B	1	Ancillary Bldg
		C	1	Old Main/Bldg H-1
		EA	1	Rehab Facility - Structure A
		EB	2	Rehab Facility - Structure B
		EC	1	Rehab Facility - Structure C
		K	3	West Wing
		M	5	Main Hospital
		S1	5	Energy Plant Struct. Upgrade
		S2	5	Energy Plant Boiler Rm Addition
U	5	M&E Bldg		

Table A-6. SPC Ratings by Building – Santa Clara County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
10943	Stanford Medical Center	1	1 or 2	Central Core
		2	1	Central Core West & East
		3	1	Boswell Bldg
		4	1 or 2	West Pavillion
		5	1 or 2	East Pavillion
		6	3	Phase I Central Core Expansion
		7	4	Nursing Pod D
		8	4	Nursing Pod E
		9	4	Nursing Pod F
		10	3	Diagnostic Treatment Center
		11	3	Atrium
		12	3	F Pod Extension
		13	4	NMR Bldg
		14	3	L.S. Packard Children's Hospital
		Grant Bldg	1	n/a
		Alway Bldg	1	n/a
		Lane Bldg	1	n/a
		Edwards Bldg.	1	n/a
		Cogen Bldg	5	
		Boiler Bldg	1	
		Cooling Tower #3	1	
Cooling Tower #4	5			
Steam Tunnel	2			

Southern California Counties

Table A-7. SPC Ratings by Building – Los Angeles County

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
11399	Antelope Valley Hospital	1	1 (self declared)	
		2	1 (self declared)	
		3	1 (self declared)	
		4	1 (self declared)	
		5	1 (self declared)	
		6	4	
		7	4	
		8	Exempt	
		9	4 or 1	
		10	3	Tower Bldg, ER Addn
		11	4	
		12	4	
		13	4 or 1	
		14	1 (self declared)	
11417	Barlow Respiratory Hospital	1	4	Outpatient & Lab Addn
		2	1 (self declared)	Dining and Kitchen
		3	1 (self declared)	Addition
		4	1 (self declared)	Addition
11430	Bellwood General Hospital	1	1	1955 Original Bldg
		2	4	1974 Emergency Addn
		3	4	1989 West Addition
11441	Beverly Hospital	Block I	1	Service Bldg & Addns
		Block II	1	Home Health
		Block II	1	Nursing Units
		Block II	1	Lab
		Block II	1	Addn and Lab Remodel
		Block III	1	1957 Nursing Admin.
		Block IV	1	1958 Acctg. & Resp
		Block V	1	Emerson Wing\Nursing
		Block VI	1	Main, Utility & Towers
		Block VI	1	Surgery
		Block VI	1	Doctors Lib and Dining
		Block VII	4	Canopy
Block VIII	4	OB Addition		
Block IX	5	MRI Facility		

Table A-7. SPC Ratings by Building – Los Angeles County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
11848	Brotman Medical Center	1	1 (self declared)	Tower
		2	1 (self declared)	Pavilion
		3	1 (self declared)	Outpatient Bldg & Addns
11480	California Hospital Medical Center	1	3	Tibbits Tower A
		2	3	Tibbits Tower B
		3	3	Admitting Bldg
		4	1 or 2	D&T Bldg
		5	1 (self declared)	1963 Central Plant
		6	1 (self declared)	1969 Central Plant
		7	1 (self declared)	1964 Tower
11891	Cedars Sinai Medical Center		2	Main Medical Center
			2	Harvey Morse Center Addition
			2	Becker Bldg Addition
			5	Boiler's Room
			5	Utility Tunnel
11510	Centinela Hospital Medical Center	1	1 (self declared)	ER Addition a.k.a West Wing
		2	1 (self declared)	Day Surgery a.k.a. North Wing
		3	1	Dietary Storage
		4	4	East Tower
		5	1 (self declared)	West Tower
		6	1 (self declared)	Engineering
		7	1 (self declared)	East wing
		8	1 (self declared)	Central Plant Addition
		9	1 (self declared)	Nursery Addition
		10	1 (self declared)	Laundry
12874	Century City Hospital	1	2	Hospital

Table A-7. SPC Ratings by Building – Los Angeles County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
11525	Children's Hospital Los Angeles	1	1	Duque Bldg
		2	3	Page Tower
		3	1	McAllister Bldg
		4	3	Page Bldg
		5	3	Weingart Pavilion
		6	3	McDonald's Bldg
		7	4 (self declared)	Linear Accelerator
		8	Exempt	DWP Substation
11748	Citrus Valley Med. Center - Inter-Com. Campus		1	1954 Original Bldg
			1	1958 East Wing & 1968 3rd Floor Addition
			1	1958 W Wing & 1972 Dock Freezer Addn
			1	1964 Psych Wing & 1972 CCU Addn, 1988 2nd Fl Surgery Wing
			1	1964 Lobby & 1975 Lobby Addn
			1	1954 Generator Bldg & 1973 & 1988 Remodels
			4	1975 Power Plant
			5	1975 Radiology Addn
			4	1975 Confer Rm Addn
			5	1976 Surg Wing Addn
11527	City of Hope National Medical Center		4	Food Services
			4	ICU
			2	Wing 1
			2	Wing 5
			2	Wing 6
12744	Daniel Freeman Marina Hospital	1	1	Original Building 1969
		2	4	8-Bed CCU-1997 Addn
		3	4	Outpatient Clinic Urgent Care-1984 Addn
11645	Daniel Freeman Memorial Hospital	1952	2	Original
		1957	2	North Wing
		1957	2	West Wing
		1967	1	East wing
		1967	2	Laboratory
		1967	2	Kitchen Addition
		1976	4	Rehabilitation Wing
		1995	4	Services
12180	Doctors Hospital Of West Covina		2	Medical Office Bldg
			2	Hospital Bldg
			2	Med Office Bldg Addn
			2	Hospital Bulletin Addn
			4	Air Cond Platform

Table A-7. SPC Ratings by Building – Los Angeles County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
15535	Doheny Eye Institute	1	3	
		1	1	Original Nursing Tower
		2, 5, 8	2	Orig Surg, Lab. 2 addn
		3	1	Confer Room Addn
		4	1	Pathology Addition
		6	4	ER/Surgery Addn 1976
		7	5	1981 ICU/CCU Addn
		9	5	Cath Lab
		10	5	1986 36-Bed Addition
		11	5	36-Bed Addn Bldg A
		12	5	36-Bed Addn Bldg B
		13	5	36-Bed Addn Bldg C
		14	5	Radiology Addition
		15	5	ER Addition
		13093	Foothill Presbyterian Hospital, Johnston Mem.-Glendora	1
2	3			Gift Shop Addition
11668	Glendale Adventist Medical Center	1	1	Rehab Wing
		2A	1	Ment Health & W Addn
		2B	4	Mental Health S Addn
		3A	3	Main Bldg - North
		3B	3	Main Bldg - South
		3C	4	Main Bldg -W (SICU)
		3D	4	Cooling Tower
		4	4	Wilson Parking
		5	1	1955 Wing
		6	1	New Surgery
		7	4	Link Bldg
		8	1	T.C.U.
		9 & 13	1	D&T Plant
		18	5	Woman's Pavilion

Table A-7 SPC Ratings by Building – Los Angeles County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
11844	Glendale Memorial Hospital	1	1 (self declared)	Original Bldg
		2	1 (self declared)	1942 Bldg
		3	1 (self declared)	Radiology Addition A
		4	1	Radiology Addition B
		5	1 (self declared)	South Tower
		5A	1 (self declared)	Admin Bldg
		6	1 (self declared)	Juncture Bldg
		7	1 (self declared)	Patient Tower
		8	3	Heart and Emergency Center
		9	3	Central Plant
		10	4	Mechanical Bldg
11688	Granada Hills Community Hospital		1 (self declared)	1964 Original Bldg
			1 (self declared)	1964 Tertiary Care Unit
			4	1976 Patient Tower
			5	1976 Radiology Addition
			3	1976 Lobby Addition
			5	1976 Surgery Addition
			5	1976 Emergency Generator Addition
			5	1976 Dining Rm Addition
			5	1976 West & South Corridor Addition
			5	1984 OB Addition
			5	2000 Mechanical Addition
13224	Greater El Monte Community Hospital	1	2	Main Hosptial/Radiology Addition
		2	4	Nursery & LDR Addition
11865	High Desert Hospital	1	1	Main Hospital/ Surgical Addn
		2	4	Emergency Generator Bldg
		3	1	Central Plant Addn

Table A-7 SPC Ratings by Building – Los Angeles County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
11718	Hollywood Community Hospital of Hollywood		1	1960 Original Bldg
		1	3	East Tower
		1A	5	East Tower
		1L	5	East Tower
		3	3	La Vina
		4		Della Martin
		5	5	Energy Plant
		6	4	Chiller
		6A	1	Chiller
		7	1	Boiler
		8	4	Cooling
		9	4	Oxygen
		10	1	Valentine
		11	1	Wingate
		12	1	Hahn
		13	1	Service
		14	1	1938
15	1	1921		
16	1	Jenks		
17	1	Exist Generators		
17207	Kaiser Permanente Medical Center - Baldwin Park	1	3	Patient Tower
		2	3	Clinic Wing
		3	3	MRI Building
		4	5	Central Plant
15801	Los Angeles County - Olive View UCLA Medical Center-Sylmar	1	4	Main Hospital Building
		2	4	Central Plant
		3	4	Cooling Tower
11774	Lancaster Community Hospital	1	1	1967 Main Bldg
		1a	1	1981 X-ray Addition
		3	1	1974 Pediatrics Addn
		4	5	1974 Emer Generator
		5	5	1976 Coronary Addn
		6	5	1976 Clinical Lab Addn
		7	5	1981 Kitchen Addn
		8	5	1976 Specialty Procedures Surg Addn
		9	5	1981 North Wing Addn
		10	5	1981 Admin Off Addn
		11	5	1981 Surgical Addn

Table A-7 SPC Ratings by Building – Los Angeles County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
11787	Little Company of Mary Hospital		5	Radiation Therapy Bldg
			5	West Tower
			4	Dining Rm Addn
			5	Generator Bldg
			4	South Tower
			1	Original Bldg
11545	Los Angeles Community Hospital	1	1	1956 Original
		1a	1	1958 Addition
		1b	1	1958 1st Story Addition
		1c	1	1965 Penthouse addn
		1d	1	1972 2nd Story Addn
		2	1	1972 Dietary Addition
11910	Los Angeles Community Hospital of Norwalk	1	1	1954 Original Bldg
		1a	1	1956 North Wing Addn
		1b	1	1956 South Wing Addn
		2	5	1974 Service Enclosure
		3	5	1981 Admin Addn
		4	5	1983 ICU Addn
11976	Los Angeles County Rancho Los Amigos National Rehabilitation Center	1A	1	704
		1B	1	703
		1C	1	702
		1D	1	700
		1E	1	701
		1F	1	S Enclosed Passage
		1G	1	North Enclosed Passage
		2A	1	Main Hospital
		2B	4	Main Hospital Expansion
		2C	1	Outpatient Entr Addn
		3	1	900
		4A	3	JPI South Wing
		4B	3	JPI North Wing
		4C	3	JPI West Wing
		5A	5	Central Plant
		5B	5	Fire Pump
		6	1	Harriman
		7	5	Safety Police
		8	1	Medical Records
		9	1	Kitchen
		10	1 (self declared)	500
11	1 (self declared)	Old Central Plant		

Table A-7 SPC Ratings by Building – Los Angeles County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
11809	Los Angeles County Harbor UCLA Medical Center	1A	2	Main Hosp Pat Tower
		1B	1	North Wing
		1C	1	South Wing
		1D	4	Cafeteria
		1E	4	Footlighter Child Learning Cen
		2	3	Patient Care Diagn Cen
		4A	4	Central Plant
		4B	4	Central Plant W Expan
		7	4	Comm Building 2 East
11164	Los Robles Regional Medical Center	1	1	North Wing/Cent Core
		2	1	South Wing
		3	4	West Wing
		4	3	New South Wing
		5	5	Emergency Expansion
12259	Martin Luther King, Jr./Charles R. Drew Medical Center	01A	1	Main Hospital Building
		01B	1	Main Hospital Building
		01C	1	Main Hospital Building
		01D	4	Main Hospital Building
		2	2	Med Recs & Lndry
		03A	4	Central Plant Bldg
		03B	4	Central Plant Bldg
		04A	1	Orig Cooling Tower
		04B	1	Second Cooling Tower
		6	3	Pediatric Acute Care
		7	5	Trauma Center
8	4	Hawkins Bldg.		

Table A-7 SPC Ratings by Building – Los Angeles County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
11858	Methodist Hospital of Southern California	1	1 (self declared)	Main Bldg
		2	1 (self declared)	East Wing
		3	1	Utility Bldg/Cen Plant
		5	1 (self declared)	West Wing
		6	1	Main Bldg - North End
		7	1	Pavilion East & West
		8	4	Hoefflin Wing
		9	3	Surgical Wing
		10	5	Patient Tower
		11863	Midway Hospital Medical Center	1
2	1 (self declared)			East Wing & Additions
3	1 (self declared)			West Wing / Additions
4	1 (self declared)			Pavilion Addition
11847	Mission Community Hospital	A	1	Patient Tower
		B	1	Ancillary Building
		C	1	Emergency Dept Bldg
12878	Monterey Park Hospital	1	2	Original Building
		2	4	Radiology Basem Addn
11887	Motion Picture & Television Fund Hospital	1	4	Skilled Nursing Facility
		2	1	Admin Building
		3	Exempt	Wings E, F, G, H
		4	1	Wings J, K
		5	1	Wings A,B,C,D
		6	4	Utility Enclosure
		7	Exempt	Financ Serv/Maint Fac
11906	Northridge Hospital Med. Center - Roscoe Campus	1	3	Farr Tower
		2	3	Emergency Rm Addn
		3	3	D&T Bldg
		3A	3	MRI Addition
		3B	3	Outpatient Regist Addn
		4	4	Support Services
		5	3	IFL Bldg
		6	3	Therapy Pool Bldg
		7A & 7B	3	Clinical Lab Bldg
		8	1	F Tower
		9	1	G Tower
		10	3	Cancer Cntr
	11	3	Quiet/Dining	

Table A-7 SPC Ratings by Building – Los Angeles County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use		
12137	Northridge Hospital Medical Center	1	1	Hospital Tower		
		2	3	ER Addition		
		3	3	Med Records Addition		
11646	Pacific Alliance Medical Center	1	1	West Wing		
		2	1	East Wing		
		3	2	Northwest Wing		
		4	2	Northeast Wing		
		4a	Exempt	Central Plant		
		4b	Exempt	East Stair Tower		
		5	2	South Wing		
11968	Presbyterian Inter-Community Hospital	1	1	1957 Orig Pat Tower		
		2	1	1957 Bldg. Serv Core		
		2a	-	1962 ICU Tower Addn		
		2b	-	1965 Emergency Cobalt		
		2c	-	1968 East Addn		
		2d	-	1968 West Addn		
		3	1 (self declared)	1968 Long Term Care		
		4	3	1976 Health Center		
		5	5	1976 Power Plant		
		6	4	1986 Radiation Therapy		
		7	3	1992 Pavilion		
11726	Providence Holy Cross Medical Center-Mission Hills	1	3	Main Bldg		
		2	4	ICU/CCU Bldg		
		3	3	Cardiac Heart Center		
		4	1	Central Plant Bldg		
		5	4	Utility Bldg		
		6	3	Chapel Bldg		
		7	3	Porte-Cochere		
		11	1	Old Utility Tunnel		
		12	4	New Utility Tunnel		
		13	3	New Equipmnt Shelter		
		14	1	Old Equipmnt Shelter		
		11722	Queen of Angels - Hollywood Presbyterian Medical Center	1	1 (self declared)	North Wing
				2	1 (self declared)	South Wing
				3	1 (self declared)	D&T Tower
4	3			Patient Tower		
5	1 (self declared)			Kitchen Addition		
6	3			Emergency Addition		
7	4			Linear Accel Addition		

Table A-7 SPC Ratings by Building – Los Angeles County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
11971	Queen of the Valley Med. Center.- QV Campus	1	1	1960 Main Bldg & 1968 5th/6th Floor Addn
		2	4	1960 Service Bldg
		3	1	1968 South Wing Addn
		4	1	1968 West Wing Addn
		5	4	1979 Outpatient Addn
		6	4	1979 Mechanical Bldg
		7	1	1983 Lobby Addn
		8	1	1988 MRI/CT Bldg
		9	4	1989 Chiller Rm Addn
		10	3	1991 Cardiac Cath Lab Addn
		11	5	1999 Maternal/Child Health Cntr
11706	Robert F. Kennedy Medical Center	1	2	West Wing
		2	2	Physical Therapy
		3	1 (self declared)	DOC\MICU\East Wing
		4	1 (self declared)	Main Tower
		5	1 (self declared)	South Wing
		6	1 (self declared)	Cafeteria
		7	1 (self declared)	Surgery I
		8	2	Surgery II
		9	4	Administration
		10	1 (self declared)	Warehouse
12014	Saint Vincent Medical Center	1	1 (self declared)	Main Hospital
		2	1 (self declared)	Central Plant/Parking Garage
		3	1 (self declared)	Doheny Wing
		4	5	Cath Lab
11548	San Gabriel Valley Medical Center	1	1	Pavilion
		1A	1	Cooling Tower
		2	4	Radiology
		2A	3	Surgery
		3	3	Emergency
		4	3	CCU
5	3	Patient Tower		

Table A-7 SPC Ratings by Building – Los Angeles County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
12023	San Pedro Peninsula Hospital	1N	1 (self declared)	Central Wing - North
		1T	1 (self declared)	Central Wing - Tower
		1S	1 (self declared)	Central Wing - South
		1R	1 (self declared)	Central Wing - Stair Tower
		2	1 (self declared)	West Wing
		2E	1 (self declared)	West Wing - Elevator Tower
		3	3	East Wing
		4	4	Laboratory Addn
		5	5	Conference Center
		12985	Santa Marta Hospital	1A
1B	2			1969 South East Wing
2	1			Utility Enclosure
3A	4			1987 Addition - West
3B	4			1987 Addition - East
12047	Sherman Oaks Hospital and Health Center	1	1	1956 Original
		2	1	1966 Hospital Addition
		3	3	1978 Burn Center
		4	1	1961 Addition
		05A	1	1977 Surgery Addition
		05B	1	1978 Laboratory Addition
		6	1 (self declared)	1978 ER Addition
		7	1 (self declared)	1985 Surgery Addition
		8	4	1979 Chiller Room
12011	St. Luke Medical Center	1	1 (self declared)	Main Hospital Bldg
		2	1 (self declared)	Annex Bldg
		3	1 (self declared)	Emergency Bldg
		4	4 (self declared)	Radiology Bldg
		5	4 (self declared)	ICU/CCU Bldg
		6	4 (self declared)	Central Plant Bldg
		7	3	OB/Surgery Bldg

Table A-7 SPC Ratings by Building – Los Angeles County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
12012	St. Mary Medical Center, Long Beach	1	1 (self declared)	Bauer Wing
		2	4	MRI Bldg
		3	1 (self declared)	West Wing
		4	1 (self declared)	East Wing
		5	1 (self declared)	South Wing
		6	4	Emergency/Generator Bldg
12787	Suburban Medical Center	1	1	Hospital
		2	4	ER Addition
12249	Torrance Memorial Medical Center	1	1	Orig bldg - cen tower and base
		2	1	original central plant
		3	3	east wing
		4	3	lobby addition
		5	5	surgery addition
		6	3	doctors dining/med recs
		7	3	admitting/business
		8	5	linear accel (PBX vault)
		9	5	Central Plant Addition
		10	3	north wing
		11	4	n wing elevator core
		12	5	MRI Addition
		13	3	cath lab addition
		14	3	ambulatory care addn
		15	3	gallery
		16	5	central plant expan - A
		17	5	central plant expan - B
		18	5	cen plant/s wing addn
		19	5	east wing addition
12841	Tri-City Regional Medical Center	1	1	Main Building
12033	UCLA Santa Monica Hospital	1	3	Merle Norman Pavilion
		2	1 (self declared)	Lobby/Hosp. Entrance
		3	1 (self declared)	Emergency Bldg
		4	1 (self declared)	Hospital Tower
		5	1 (self declared)	Old Central Plant
15179	USC Kenneth Norris, Jr. Cancer Hospital	1	4, 5	Acute care

Table A-7 SPC Ratings by Building – Los Angeles County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
11414	Vencor LA/Kindred Hospital Los Angeles	I	1	ICU
		II	1	Central Nurse
		III	3	
		IV	4	
		V	4	Storage Maintenance
12551	Verdugo Hills Hospital - Glendale	1	1	Main Bldg. North Tower
		2	1	Main Bldg. South Tower
		3	4	1984 West Addition
		4	4	1984/85 East Addition
12182	West Hills Medical Center	1	1	Main Bldg 1
		2	4	Purchasing/Central Supply
12198	White Memorial Medical Center	1	1 (self declared)	West Bldg
		2	1 (self declared)	Boiler Bldg
		3	1 (self declared)	Service Tunnel
		4	1 (self declared)	Main Bldg
		5	1	D & T Bldg
		6	1	East Bldg
		7	2	Chiller Bldg
		8	1 (self declared)	Main Bldg Addition
		9	3	East Bldg Addn
		10	3	South Bldg
		11	5	Emergency Generator Bldg
		12	1 (self declared)	Supply Storage & Plumbing Shop
		13	1 (self declared)	Carpentry & Paint Shop
12201	Whittier Hospital Medical Center	1	1	Original Building
		2	1	Addition 1
		3	1	Addition 2
		4	1	Addition 3
		5	4	ER Addition
		6	3	OB Addition
		7	4	Pediatrics Addition

Table A-8 SPC Ratings by Building – Orange County

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
10382	Anaheim Memorial Hospital	1	1	Central Plant
		2	1	Main Hospital - 2 story patient tower
		2a	1	Patient tower addition levels 4 and 5 (Cromer Tower)
		2b	1	Cath Lab Addition
		3	1	Radiology, ER, OR expansion
		3a	1	Radiology, ER, OR expansion
		3b	4	Radiology, ER, OR expansion
		3c	4	Radiology Renovation Phase 1
		4	3	Phase IV North Wing
		4a	4	Phase IV East Entrance
		4b	4	Ushawl Orange County Dialysis
5	4	Main Entrance Bldg		
10400	Chapman Medical Center	1	1 (self declared)	Main Bldg
		2	4	Entry Pavillion
		3	5	Mechanical Bldg
		4	4	ICU/Admin Addition
		5	5	Surgery Addition
10922	Children's Hospital of Orange County at Mission (CHOC at Mission)	5th Floor of Mission Hospital Tower	(see above)	(see above)
12834	Fountain Valley Regional Hospital	1	1	Main Hospital /Additions
		2	4 (self declared)	Women & Children's Hospital
		3	4 (self declared)	Dining Room Addn.
		4	4 (self declared)	Conference Room Addn
		5	3	Living Care Center
		6	1 (self declared)	ER Addition

Table A-8. SPC Ratings by Building – Orange County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use		
10428	Hoag Memorial Hospital Presbyterian	1	1	1952 Hoag Original Bldg		
		2	1	4-Story Bldg		
		3	1 (self declared)	1957 Addition		
		4	1	Old ICU		
		5	1	Chemical Dependency		
		6	1 (self declared)	Admitting (Canned Ham)		
		7a	4	Power Plant Boilers & Chillers		
		7b	4	Power Plant MUSS & ATS		
		7c	n/a	Power Plant Emerg. Generators		
		7d	n/a	Power Plant Cooling Towers		
		8	exempt	Surgical Center & Addition		
		9	1	Inpatient Tower		
		10	1	Ancillary		
		11	1	Helistop		
		12	4	Old Radiation Therapy		
		13	exempt	Not Used		
		14	3	Cancer Cntr		
		15	3	MRI		
		16	3	South Entrance		
		17	1	ER West Waiting Room Addition		
		18	3	MRI Addition		
		19	3	Link Bldg		
		20	5	Emergency Dept. Addition		
		21-26	exempt			
		27	5	Radiology Waiting Rm Addition		
		16319	Irvine Medical Center	1	4	D & T Bldg
				2	4	Nursing
13078	Kaiser Permanente Hospital - Anaheim	1	1 (self declared)	Hospital Tower		
		2	1	Ancillary Bldg 1		
		2a	1	Storage Addition		
		2b	1	Corridor Extension Addition		
		3	4	Ancillary Bldg 2 - Material Managmnt		
		4	4	Ancillary Bldg 3 - P.T.O.T Wing		

Table A-8 SPC Ratings by Building – Orange County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
10440	Los Alamitos Medical Center	1	1	Main Hospital Bldg/ICU-CCU/Nuclear Medicine
		2	3	OB South/ER/Lab
		3	5	Women's Center
		4	5	Linear Accelerator
12804	Mission Hospital Regional Medical Center		1	Pavilion Bldg 1
			5	Pavilion Bldg 2
			4	Pavilion Bldg 3
			4	Pavilion Bldg 4
			5	Pavilion Bldg 5
			4	Conference Center Bldg (General Support Services Bldg)
			4	Hospital Tower
15630	Orange Coast Memorial Medical Center		3	Original
			3	South Addition
			3	Emergency Room
10439	Orange County Community Hospital	1	1	1959 Original Bldg
		2	5	1980 Business & Dining Addition
		3	5	1984 Emergency Rm Addition
		4	5	1984 Patient Wing Addition
13077	Placentia-Linda Community Hospital	1	1	Main Hosp. & Addition
		2	5	Patient Rm Addition
		3	5	O.B. Addition
		4	1 (self declared)	Classrooms & Additions
12755	Saddleback Memorial Medical Center		1	Main Hospital
			4	Women's Health Center
			1	Central Plant - Steel Portion
			2	Central Plant - Concrete Portion
13066	San Clemente Hospital and Medical Center	1	1	Original 1971 Hospital
		2	5	1995 ER Expansion
10456	Santa Ana Hospital	1	1 (self declared)	Main Hospital & additions
		2	4	OB/GYN Addition
		3	4	Dining/Cafeteria Bldg
		4	4	Dining/Cafeteria Bldg

Table A-8 SPC Ratings by Building – Orange County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
10456	Santa Ana Hospital	1	1 (self declared)	Main Hosp & Addns
		2	4	OB/GYN Addition
		3	4	Dining/Cafeteria Bldg
		4	4	Dining/Cafeteria Bldg
		5	4	Cafeteria Passage
		A	1	Original
10468	South Coast Medical Center	B	1	Nursing Tower
		C	1	Elevator Tower
		D1	1	Radiographic
		D2	1	Radiographic South Wing
		E	1	Administration
		F	1	Mechanical \ Central Plant
		G	1	Linear Accelerator Suite\Treatment Room
		1	1 (self declared)	Original Bldg
10407	Specialty Hospital of Southern California - Santa Ana Campus	2	4	1976 Addition
		3	4	Cystoscopy
		4	4	ICU Addition
		5	4	Nursing/Admin
10457	St. Joseph Medical Center		1	Main Hospital (A)
			1	Central Plant
			1	East/West Wing
			1	South Tower
			4	North Wing & Lobby
			4	Main Hospital Addition B
			4	Main Hospital Addition C
			4	Regional Cancer Center
			5	Emergency Dept. Expansion
			5	Canopy Addition
			5	Generator Enclosure

Table A-8. SPC Ratings by Building – Orange County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
10458	St. Jude Medical Center	-	1	Main Hospital
		-	1	Basement Expansion
		-	1	Boiler Rm Expansion & Chiller Rm
		-	1	Patio Canopy
			1	West Building
			1	North Bldg
			4	CT Scan Expansion
			4	Outpatient Admitting
			5	Linear Accelerator
			5	Ambulance Canopy
			4	Emergency Room Expansion
			4	MRI & Surgery
10446	University of California, Irvine Medical Center	1	1	Main Hospital Bldg
		1A	3	Hospital Annex
		3	Exempt	Neurpsychiatric Center
		31	1	Steam Plant
		32	4	Primary Electrical Facility
		(Tunnel)	2	Utility Tunnel
		(Cancer Center)	Exempt	Chao Cancer Center
13068	Vencor Hospital - Brea	1	3	Original Building 1969
		2	3	Multi-Purpose Room
10476	Vencor Hospital - Orange County	1	1	Main bldg
		2	1	Entrance Lobby
		3	1	Surgical Area
		4	4	Scanner Room
13061	Western Medical Center - Anaheim	1	2	Pyschiatric Treatment
		2	1 (self declared)	Main Hospital Bldg
		3	4	ICU/CCU Unit
		4	4	ER Addition/Birthing Center
		5	4	Canopy Addition
18007	Western Medical Center - Santa Ana	1	1 (self declared)	Ancillary Bldg/ER Expansion
		2	2	Elevator Tower
		3	2	Nursing Tower
		4	1 (self declared)	Admin
		5	2	Shipping & Receiving
		6	2	Mechanical Bldg
		7	2	Radiation Therapy
		8	5	Support Services

Table A-9 SPC Ratings by Building – San Diego County

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
12872	Alvarado Hospital Medical Center	1	1 (self declared)	
		2	4	Rehabilitation Hospital
		3	4	Connecting Bridge
		4	1 (self declared)	
		5	1 (self declared)	
12285	Children's Hospital - San Diego	1A	1	Nelson Family Pavil-A
		1B	1	Nelson Family Pavil-B
		1C	1	Nelson Family Pavil-C
		1D	1	Nelson Family Pavil-D
		1E	1	Nelson Family Pavil-bridge
		2	1	Nelson Family Pav-medical wing
		5	1	Dining Area
		6	1	Gait lab
		7	1	Warehouse/Shop
		8	4	Old Gait Analysis Lab
		9	4	2nd Dining Room
		10	4	ICU
		11A	4	Surgical Unit
		11B	4	Hahn Co-generat Plant
		12	3	Hahn Clinical Lab
		13	4	Nelson Nursing Expan
		14	3	Hahn Radiology Expan
15A	3	Children's Way-S Half		
15B	3	Children's Way-N Half		
12268	Chula Vista Hospital	1	1	Original
		2 & 2A	1	Tower Bldg & Tower Connector Bldg Addn
		3	4	Emergency Room Addn
		4	5	Hospital Expansion
		4A	5	Hospital Expansion
		4B	5	Hospital Expansion
		4C	5	Mechanical Bldg
13111	Kaiser Permanente Medical Center - San Diego	1	1	Hospital Tower
		2	3	Hospital Tower Addn
		3	3	Clinic Tower Addition
		4	4	Central Plant
		5	4	Emerg Generator Bldg
		6	4	Chiller Bldg

Table A-9 SPC Ratings by Building – San Diego County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
12347	Palomar Medical Center	1	1	McLeod Tower
		2	1	McLeod Tower E Ext
		3	1	Adams Wing
		4	4	West Wing
		4a	4	Parking Garage with Helistop
		4b	4	Med Recs & Tumor Reg
		5	4	South Wing
		5a	4	Cafeteria
		6	4	Co-Generation Plant
		7	Exempt	Linear Accelerator
		8	Exempt	Computer Repair
		9	4	Linear Accelerator Extension
		12348	Paradise Valley Hospital	1
2	1			West Wing
3	4			East Wing
4	4			ER Expansion
5	4			Boiler Building
6	5			Pediatrics Wing
7	5			Chiller Bldg
8	5			Generator Bldg
9	3			Medical Office Bldg
10	1			Storage Building
12363	Scripps Memorial Hospital-La Jolla	1, 3, 4	1	
		1A	1	
		2	1	West Tower
		5	2	Transition Tower
		5A	5	Addition to Women's Center
		6	1	East Tower
		6A	2	
		7	1	
		8, 8A, 8B	1	Service Building/Bldg 8,8A, 8B
		9	4	Co-Generation Plant
		10	3	
		11	3	Emergency Expansion
		12	Exempt	Dining Area
		13	Exempt	Mericos Bldg.
14-23	Exempt	Various Buildings		

Table A-9 SPC Ratings by Building – San Diego County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
12339	Scripps Mercy Hospital	2	1 (self declared)	Boiler Bldg
		4	2	Main Hospital Tower
		4A	4 (self declared)	Main Hospital Wing (orig.)
		5	1 (self declared)	ICU Bldg
		6	1 (self declared)	Addn to Boiler Bldg & Lab Bldg
		7	1 (self declared)	ICU Addition
		8	1 (self declared)	Elevator Tower
		9	3 (self declared)	North Ambulatory Addn
		9A	3 (self declared)	Ambulatory Addn (elevator tower)
		9B	3 (self declared)	Ambulatory Addn
		9C	3 (self declared)	Ambulatory Addn (existing roof to 2nd floor conversion & 3rd floor addn)
		10	1 (self declared)	Original Generator Bldg & Cooling Tower
		11	1 (self declared)	New Generator Bldg
		12	5 (self declared)	Sefton Emergency Services
13	Exempt	Mechanical Tunnel (not a bldg)		
14	1 (self declared)	Clinic Bldg		
12295	Sharp Coronado Hospital	1	1	Main Tower
		2	2	ICU Bldg
		3	1	Ancillary Building
		4	2	Emergency Generator Bldg
		1	3	Mary Birch Women's Center
12364	Sharp Memorial Hospital - San Diego	2	3	MRI
		3	3	New Central Plant
		4	1	Rehabilitation Center
		5	1	South Tower
		6	1	east building
		7	1	Central Building
		8	1	West Building
		9	1	Inter-Hospital Passageway

Table A-9 SPC Ratings by Building – San Diego County (cont'd)

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
12372	Tri-City Medical Center	1	1	Center Tower
		2	1	North Wing
		3	4	Center Complex
		4A	1	South tower
		4B	1	S Tower S Stair shaft
		5A	4	Electical Bldg.
		5B	4	Electical Bldg.addition
		6	4	1976 addn cent complex
		7	4	Materials/Laboratory
		8	4	1976 Addn-Radiology
		10	4	Administration
		12A	4	Pavilion Bldg.
		12B	4	Pavilion Bldg canopy
		13	4	Ancillary Building
		14A	4	ER Addition
		14B	4	ER Addition Canopy
		12359	University of California, San Diego Medical Center - Hillcrest Campus	15A
15B	4			Perinatal/Women's cen Canopy 1
15C	4			Perinatal Unit/Women's center Canopy 2
15D	4			Perinatal Unit/Women's center Canopy 3
16A	4			Surgery Addition 1
16B	4			surgery Addition 2
16C	4			Surgery Addn canopy
17	4			central plant
1a	2			Main Building-base
1b	2			Main Building-Tower
1c	4	Main Building-Link		
11659	University of California, San Diego - La Jolla - Thornton Hospital	2	3	S Wing Ancillary & Sup
		3	Exempt	Psych. (West Wing)
		4a	4	Boiler Room
		4b	1	Chiller Plant
		5	1	Utility Line Bridge
		6	2	Telecommunications
		7	Exempt	Outpatient Clinic
		1A	2	North Bldg
12328	Vencor Hospital San Diego	1B	2	South Bldg
		A	2	
		B	1	
		C	1	
		D	4	
E	-			

Table A-10 SPC Ratings by Building – Ventura County

Fac. No.	Hospital Name	Bldg No.	SPC Rating	Building Use
11159	Community Memorial Hospital - San Buenaventura	1	1	Goodyear Wing
		2	1	Main Bldg. and Addition
		3	1	Gift Shop
		4	1	West Wing and Addition
		5	4	South Wing
		6	4	North Wing and OB/Gyn Addition (Vert Exp)
		7	4	Ambulatory Surg & OB/Gyn Addition
		8	4	ER Addition
		9	4	Emergency Generator Bldg
		10	4	Oxygen tanks
11169	Ojai Valley Community Hospital	1	1	Main Hospital
		1A	1	ICU Addition/Remodel
		2	4	Nursing Wing Addition
		3	4	Laboratory Additions
11175	Santa Paula Memorial Hospital	1	1	Main Building
		2	1	ICU Addition
		3	5	ER Addition
		4	5	Storage
		5	5	Generator Building
		6	5	Infectious Waste
13181	St. John's Pleasant Valley Hospital	1	1	Main Hospital
		2	3	Central Plant/Utilities Building
		3	3	Ancillary Building
		4	3	Ambulatory Surgery Ctr
		5	3	ER Entrance Canopy
11172	St. John's Regional Medical Center	1	3	Link Building 1
		2	3	Hospital Building
		3	3	Patient Tower
		4	4	Link Building 2
		5	4	Central Plant
		6	4	Canopy & Entrance Bridge
11162	Ventura County Medical Center	1	1	Main Hosp Bldg 305
		2	5	Fainer Wing Bldg 304
		3	1	Administration Bldg 306
		4	5	Mental Health Center
		5	2	Steam Plant Bldg 328
		6	2	Switch Bldg 349
		7	4	Generator Bldg 366

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