September 2015 | Initial Study

PROPOSED CALIFORNIA MECHANICAL CODE CHANGE ALLOWING PLENUM RETURN AIR IN CERTAIN AREAS OF OSHPD 3 CLINICS

for Office of Statewide Health Planning and Development

Prepared for:

Office of Statewide Health Planning and Development
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Notice of Availability and Notice of Intent to Adopt a Negative Declaration
for
Proposed Statewide Regulations Allowing the Use of Plenum Return Air in Certain Areas of OSHPD 3 Clinics

TO: Responsible Agencies, Interested Parties and Organizations

FROM: Glenn S.A. Gall, AIA, Regional Supervisor

SUBJECT: Notice of Availability and Notice of Intent (NOA/NOI) and Initial Study

INITIAL STUDY REVIEW PERIOD: September 18, 2015 to October 17, 2015

The Office of Statewide Health Policy and Development (OSHPD) has completed an Initial Study for Proposed Statewide Regulations Allowing the Use of Plenum Return Air in Certain Areas of OSHPD 3 Clinics. The Initial Study was completed in accordance with the California Environmental Quality Act (CEQA, California Public Resources Code Sections 21000 et seq.), and State CEQA Guidelines (California Code of Regulations Sections 15000 et seq.).

OSHPD, as Lead Agency, intends to adopt a Negative Declaration (ND) for the project. The accompanying Initial Study concludes that implementation of the proposed California Mechanical Code (CMC) changes would not have a significant impact on the environment, and no mitigation measures are required.

Project Location: Statewide

Project Description:

OSHPD is proposing changes to Chapter 4, Ventilation Air Supply, of the 2016 California Mechanical Code, CCR Title 24. The proposed change would allow plenum return air in certain areas of OSHPD 3 clinics where fully ducted air return is now required by current code. The proposed regulatory changes would only apply to OSHPD 3 clinics providing outpatient services.

The following relevant text is excerpted from "The Initial Express Terms for Proposed Building Standards of the Office of Statewide Health Planning and Development Regarding Proposed Changes to California Mechanical Code California Code of Regulations, Title 24, Part 4." The proposed changes to the regulations are shown with proposed deletions in ~~strikeout~~ and proposed additions in *italic underline.* (Note: *italics* denote existing changes to model code.)

407.4.1.4 No space above a ceiling may be utilized as an outside-air, relief-air, supply-air, exhaust-air, or return-air plenum.

Exceptions:

(1) Designs specifically approved by the enforcing agency.

(2) Return air plenums shall be permitted for ***[OSHPD 3]*** *provided that spaces listed in Table 4A that have required pressure relationships shall be served by fully ducted supply, return, and exhaust systems. The following additional surgery and critical-care patient-care areas that do not require a pressure relationship shall also be served by fully ducted supply, return, and exhaust systems: (1) Recovery Rooms, (2) Treatment Rooms. In facilities that treat inpatients, mechanical systems shall utilize ducted systems for supply, return, and exhaust air.*

Environmental Impacts: No significant environmental impacts are identified in the Initial Study, and no mitigation measures are required.

Responding to this Notice: Pursuant to CEQA Guidelines Section 15082, Responsible and Trustee agencies and other interested parties, including members of the public, must submit any comments in response to this notice no later than 30 days after receipt. The Notice of Intent and accompanying Initial Study are available for a 30-day public review period beginning September 18, 2015 and ending October 17, 2015.

Copies of the document are available for review at the following location:

Office of Statewide Health Planning and Development
400 R Street, Suite 200
Sacramento, California 95811

The document can also be accessed online at: http://oshpd.ca.gov/FDD/Regulations/index.html

All comments and responses to this notice must be received in writing no later than 5 P.M. on October 17, 2015 to:

Glenn S.A. Gall, AIA
Regional Supervisor
Office of Statewide Health Planning and Development
Facilities Development Division
400 R Street, Suite 200
Sacramento, California 95811

OSHPD encourages responses to this notice be submitted via email. Email responses to this notice may be sent to Glenn.Gall@oshpd.ca.gov. For additional information, please contact Glenn Gall, AIA at 916.440.8356 or at his listed e-mail address.

Notice of Public Meeting: The OSHPD Hospital Building Safety Board (HBSB) will hear public comments on this NOA/NOI and Initial Study, and consider the ND for adoption, on or after November 18, 2015 at the California Lottery – Pavilion, 700 North 10th Street, Sacramento, CA 95811. Please contact the HBSB Board Staff for updated information on the public meeting at (916) 440-8453.

NEGATIVE DECLARATION

The Office of Statewide Health Policy and Development (OSHPD) has completed an Initial Study for Proposed Statewide Regulations Allowing the Use of Plenum Return Air in Certain Areas of OSHPD 3 Clinics. The Initial Study was completed in accordance with the California Environmental Quality Act (CEQA, California Public Resources Code Sections 21000 et seq.), and State CEQA Guidelines (California Code of Regulations Sections 15000 et seq.).

OSHPD, as Lead Agency, intends to adopt a Negative Declaration (ND) for the project. The accompanying Initial Study concludes that implementation of the proposed changes to the California Mechanical Code would not have a significant impact on the environment, and no mitigation measures are required.

LEAD AGENCY and PROJECT PROPONENT: Office of Statewide Health Policy and Development (OSHPD)

PROJECT TITLE: Proposed Statewide Regulations Allowing the Use of Plenum Return Air in Certain Areas of OSHPD 3 Clinics

PROJECT LOCATION: Statewide

PROJECT DESCRIPTION: OSHPD is proposing changes to Chapter 4, Ventilation Air Supply, of the 2016 California Mechanical Code, CCR Title 24. The proposed change would allow plenum return air in certain areas of OSHPD 3 clinics where fully ducted air return is now required by current code. The proposed regulatory changes would only apply to OSHPD 3 clinics providing outpatient services.

The following relevant text is excerpted from "The Initial Express Terms for Proposed Building Standards of the Office of Statewide Health Planning and Development Regarding Proposed Changes to California Mechanical Code California Code of Regulations, Title 24, Part 4." The proposed changes to the regulations are shown with proposed deletions in strikeout and proposed additions in *italic underline.* (Note: *italics* denote existing changes to model code.)

407.4.1.4 No space above a ceiling may be utilized as an outside-air, relief-air, supply-air, exhaust-air, or return-air plenum.

Exceptions:

(1) Designs specifically approved by the enforcing agency.

(2) Return air plenums shall be permitted for ***[OSHPD 3]*** *provided that spaces listed in Table 4A that have required pressure relationships shall be served by fully ducted supply, return, and exhaust systems. The following additional surgery and critical-care patient-care areas that do not require a pressure relationship shall also be served by fully ducted supply, return, and exhaust systems: (1) Recovery Rooms, (2) Treatment Rooms. In facilities that treat inpatients, mechanical systems shall utilize ducted systems for supply, return, and exhaust air.*

EXISTING CONDITIONS: Types of OSHPD-3 clinics, and location by region, are described in Chapter 3, *Environmental Setting*, of the accompanying Initial Study.

ENVIRONMENTAL IMPACTS: No significant environmental impacts are identified in the Initial Study, and no mitigation measures are required.

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APPENDICES

Abbreviations and Acronyms

ACH	air changes per hour
AII	airborne infection isolation
APIC	Association for Professionals in Infection Control and Epidemiology
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ATD	aerosol transmitted disease
BCG	Bacille Calmette-Guerin vaccine
CAC	California Administrative Code
CALGreen	California Green Building Standards Code
Cal/OSHA	California Occupational Safety and Health Administration
CARB	California Air Resources Board
CBC	California Building Code
CBSC	California Building Standards Code
CCR	California Code of Regulations
CDC	US Centers for Disease Control and Prevention
CDPH	California Department of Public Health
CEC	California Electrical Code
CEQA	California Environmental Quality Act
CFC	California Fire Code
cfm	cubic feet per minute
CFR	Code of Federal Regulations
CMC	California Mechanical Code
CMP	plenum-rated cable
CMX	non-plenum-rated cable
CO	carbon monoxide
CPC	California Plumbing Code
DGS	Department of General Services
DWV	drain-waste-vent
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FEP	fluorinated ethylene propylene
FEMA	Federal Emergency Management Agency
FGI	Facility Guidelines Institute

Abbreviations and Acronyms

ft	feet
GHG	greenhouse gas emissions
HAIs	healthcare acquired infections
HBr	hydrogen bromide
HCl	hydrogen chloride
HEPA	high-efficiency particulate air (filter)
HF	hydrogen fluoride
HHSA	Health and Human Services Agency
H&SC	Health and Safety Code
HVAC	heating, ventilating and air-conditioning
IAPMO	International Association of Plumbing and Mechanical Officials
ICU	intensive care unit
IFC	International Fire Code
m	meter
MERV	Minimum Efficiency Reporting Value
MMR	measles, mumps, and rubella
NEC	National Electrical Code
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
OSHPD	Office of Statewide Health Planning and Development
PE	protective environment
PPE	personal protection equipment
PO	polyolefin
PVC	polyvinyl chloride
SARS	Severe acute respiratory syndrome
SFM	Office of State Fire Marshal
TAPCOM	Technical Advisory Panel for Communications Cable
TB	Tuberculosis
UL	Underwriters Laboratories
UMC	Uniform Mechanical Code
WHO	World Health Organization

1. Introduction

1.1 OVERVIEW

The State of California Office of Statewide Health Planning and Development (OSHPD) proposes a change to the 2016 California Mechanical Code (CMC) to allow for plenum return air in certain areas of clinics and outpatient facilities (collectively "outpatient clinics"). The proposed regulatory change would apply to outpatient clinics classified as "OSHPD 3" under the California Building Standards Code (CBSC). OSHPD 3 clinics include primary care clinics, psychology clinics, freestanding specialty care clinics, and freestanding outpatient facilities affiliated with a hospital. OSHPD 3 clinics that provide inpatient services pursuant to Health and Safety Code (H&SC) section 129725(b)(1) are excepted from the proposed change. The two primary objectives of the proposal are to: 1) align the CMC more closely with national standards and 2) reduce construction costs and barriers for conversion of existing structures to OSHPD 3 outpatient clinics. The proposed changes, upon approval by the California Building Standards Commission (Commission), would become part of the 2016 CMC scheduled to take effect on January 1, 2017.

The Commission oversees the triennial compilation and publication of the adoptions, amendments, and repeal of regulations to the California Code of Regulations (CCR), Title 24, also referred to as the California Building Standards Code. Part 4 of the CBSC is known as the California Mechanical Code. OSHPD is a state-designated agency with authority to develop and propose building standards to the Commission. This Initial Study has been prepared in accordance with the California Environmental Quality Act (CEQA) of 1970, as amended, to determine if the proposed changes would have a significant impact on the environment.

As defined by section 10563 of the CEQA Guidelines, an Initial Study is prepared primarily to provide the lead agency with information to use as the basis for determining whether a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report (EIR) would be appropriate for providing the necessary environmental documentation and clearance for the proposed project.

1.2 ORGANIZATION OF THE INITIAL STUDY

The content and format of this report are designed to meet the requirements of CEQA. Therefore, this Initial Study contains the following sections:

- **Section 1, Introduction,** identifies the purpose, scope, and organization of the Initial Study.
- **Section 2, Regulatory Setting and Background,** describes the regulatory setting for the proposed mechanical code change, including discussion of pertinent agencies, and role of model codes in the CBSC adoption process.

1. Introduction

- **Section 3, Environmental Setting,** describes the area affected by the proposed project and provides information on existing and projected OSHPD 3 facilities.

- **Section 4, Project Description,** describes the project background and proposed change in detail, and describes actions required by the lead agency.

- **Section 5, Environmental Checklist,** presents the CEQA determination for the project, based on the findings in Section 6.

- **Section 6, Environmental Analysis,** provides an evaluation of the impact categories and a response to questions contained in the CEQA Guidelines Appendix G checklist. As appropriate, additional considerations are included in impact categories to address concerns that do not fit within the scope of the model checklist, but have been identified in relation to the proposed project. Further, where potential impacts are raised (e.g., infectious disease transmission) a robust discussion of the topical area is included in this document containing three elements: the Regulatory Setting describes federal, State, and local regulations applicable to the issue area; the Environmental Setting describes existing environmental conditions and provides the baseline or context by which impacts are evaluated; and the Impact Analysis describes the potential effects associated with the project. This section contains a discussion of cumulative impacts, where relevant.

- **Section 7, References,** identifies all references and individuals cited in this Initial Study.

- **Section 8, List of Preparers,** identifies the individuals who prepared the Initial Study.

2. Regulatory Setting and Background

2.1 CALIFORNIA BUILDING STANDARDS COMMISSION

The California Building Standards Commission (Commission) is under the Department of General Services (DGS). Its members are appointed by the Governor and confirmed by the State Senate. The Commission is authorized by California Building Standards Law to administer the many processes related to the development, adoption, approval, publication, and implementation of California's building standards codes. Commission responsibilities include: 1) reviewing and approving building standards proposed and adopted by state agencies and 2) codifying and publishing approved building standards in the California Building Standards Code (CBSC). The CBSC is codified as Title 24 within the California Code of Regulations (CCR). CCR is divided into several parts reflecting its subject (e.g., Part 4, California Mechanical Code).

The CBSC is published in its entirely every three years by order of the California legislature, with supplements published in intervening years. The California legislature delegated authority to various State agencies, boards, commissions, and departments to create building regulations to implement the State's statutes. These building regulations or standards take effect 180 days after their publication, unless otherwise stipulated, and have the same force as law. The proposed change, the subject of this Initial Study, is part of the 2015 Triennial Code Adoption Cycle for the 2016 CBSC, which would take effect January 1, 2017.

For this project, the Commission will be responsible for reviewing, approving, codifying, and publishing the change to the CMC proposed by OSHPD. The proposed change would allow for plenum return air in certain areas of OSHPD 3 outpatient clinics.

2.1.1 Role of Model Codes and Standards in CBSC

Under California Building Standards Law section 18928.1, the CBSC "shall incorporate the text of the model codes, applicable national specifications or published standards in whole or part, only by reference with appropriate additions or deletions therefrom." These model codes and standards, therefore, are the basis for the CBSC. California amendments are necessary, however, to eliminate conflicts with state laws, include requirements of state law, or eliminate conflict with other adopted model codes.[1] Certain parts of CCR Title 24—including Parts 6 and 11, known as the California Energy Code and California Green Building Standards Code (commonly referred to as CALGreen)—are not based on model codes. Further, under section 18930, building standards presented to the Commission are required to be justified with a written analysis that addresses several criteria, including whether the applicable national specifications, published standards, and model codes have been incorporated where appropriate. A discussion of the Uniform Mechanical Code and the applicable national standards related to health care facilities specifically follows. Model codes and

[1] California Building Standards Commission, *Guide to Title 24 California Building Standards Code: Based on the 2013 Edition of Title 24*, Department of General Services, n.d., 9.

standards pertaining to specific environmental issue areas (e.g., fire) are discussed in Section 6, *Environmental Analysis*.

IAMPO: Uniform Mechanical Code

Designated as an American National Standard, the Uniform Mechanical Code (UMC) is a model code developed by the International Association of Plumbing and Mechanical Officials (IAPMO) to govern the installation, inspection, and maintenance of HVAC (heating, ventilating and air-conditioning) and refrigeration systems. The 2013 CMC incorporates by reference the 2012 edition of the UMC, with certain California amendments. The UMC does not establish standards for health care facilities; instead, many states, including California, reference and, as appropriate, incorporate the standards established by ASHRAE (which was recently incorporated by the FGI), as described below.

American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)

The American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) is a nationally recognized technical authority in the field of HVAC system design, installation, and operation. In 2013, ASHRAE updated its *Standard 170, Ventilation of Health Care Facilities*, which is one of several documents that offer guidance, regulations, and mandates to designers of health care facilities.[2] This standard defines ventilation system design requirements that provide environmental control for comfort, asepsis (i.e., practices to prevent spread of infection/disease), and odor in health care facilities. *Standard 170-2013* establishes mandatory minimum requirements; ASHRAE standards have historically allowed for plenum return air. Other publications, such as the *HVAC Design Manual for Hospitals and Clinics* (2nd edition), complement the standard and provide additional depth and detail. *Standard 170-2013* and *HVAC Design Manual for Hospitals and Clinics* have informed OSHPD's proposed change to the CMC.

Facility Guidelines Institute

The Facility Guidelines Institute (FGI) is a not-for-profit corporation founded to provide continuity in the health care facility guidelines revision process, among other functions. The committee that compiled *ASHRAE Standard 170-2013* was cognizant of the FGI Guidelines, and many jurisdictions with enforcement authority over health care facility design also use or refer to FGI's Guidelines. In 2014, FGI published the *2014 Guidelines for Design and Construction of Hospitals and Outpatient Facilities*. *Standard 170-2013* is incorporated in its entirety as Part 4, "Ventilation of Health Care Facilities."

2.2 OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT

The Office of Statewide Health Planning and Development (OSHPD) is a department of the Health and Human Services Agency (HHSA). OSHPD was created to provide the State with an enhanced understanding of the structure and function of its healthcare delivery systems. The purpose of OSHPD's Facilities Development Division is to regulate the design and construction of health care facilities to ensure they are safe and capable of providing services to the public. This is accomplished through OSHPD's building

[2] ANSI/ASHRAE/ASHE Standard 170-2013 is a national design standard prepared jointly by American National Standards Institute (ANSI), ASHRAE, and American Society for Healthcare Engineering (ASHE) for health care facilities. The standard is referred to in this document as *ASHRAE Standard 170-2013* or *Standard 170-2013*.

standards function and as the "enforcing agency" for licensed hospital and medical care facilities, as explained below.

2.2.1 OSHPD's Jurisdiction

OSHPD is a state-delegated 'proposing agency' with authority to develop and propose building standards to the Commission. OSHPD is authorized to propose building standards (i.e., architectural, structural, mechanical, electrical, and plumbing) for licensed hospitals, skilled nursing facilities, intermediate care facilities, clinics, and correctional treatment centers.

In addition, OSHPD is the designated "enforcing agency" for certain facilities. The enforcing agency is the legal entity with jurisdictional authority for enforcement of applicable CBSC regulations and standards, including plan checking and inspection of the design and details of the architectural, structural, mechanical, plumbing, electrical, and fire panic safety systems, and observation of construction. A brief description of the facilities subject to OSHPD standards and the entity assigned enforcement responsibility is provided below.

Table 1 OSHPD Facilities[1] by Type and Enforcing Agency

OSHPD Classification	Type1	Description	Enforcing Agency
OSHPD 1	Hospitals	General acute care hospitals and acute psychiatric hospitals, excluding distinct part units or distinct part freestanding buildings providing skilled nursing or intermediate care services.[2]	OSHPD
OSHPD 2	Skilled Nursing	Skilled nursing facilities and intermediate care facilities, including distinct part skilled nursing and intermediate care services on a general acute care or acute psychiatric hospital license, provided either are in a separate unit or a freestanding building.2	OSHPD
OSHPD 3	Clinics	Licensed clinics and any freestanding building under a hospital license where outpatient clinical services are provided.	Local building official[3]
OSHPD 4	Correctional Treatment Centers	Correctional treatment operated by the Department of Corrections and Rehabilitation (CDCR), or by a law enforcement agency of a city and/or county.	CDCR or city and/or county

Source: 2013 California Administrative Code (CAC), CCR Title 24, Part 1, section 7-103.
1 See H&SC, section 129725, for definition of the terms.
2 See California Building Code, sections 1.10.1 and 1.10.2., for application of structural regulations.
3 Exceptions include when a hospital requests OSHPD to perform plan review and building inspection, in lieu of local building official, for freestanding buildings classified as OSHPD 3. See California Administrative Code, section 7-2104.

As shown, OSHPD has authority to propose building regulations for OSHPD 1, 2, 3 and 4 facilities. OSHPD amendments to model codes are identified in brackets. For example, a requirement preceded by [OSHPD 1, 2, 3, 4] would apply to all OSHPD facility classifications.

It also is the enforcing agency (i.e., has authority for review and approval of building plans and construction inspection) for OSHPD 1 and OSHPD 2 projects. Local building officials generally are the enforcing agency for OSHPD 3 projects. The determination of which clinics and outpatient facilities are subject to OSHPD 3

requirements, and whether the enforcing authority is the local agency or OSHPD, can be complex.[3] A brief description of OSHPD 3 facilities is provided below for the purpose of understanding which facilities would be affected by the proposed project.

2.2.2 OSHPD 3 Clinic Categories

The proposed change would apply to OSHPD 3 clinics serving outpatients only. "Clinics" are defined as outpatient health facilities, eligible for licensure, that provide direct medical, surgical, dental, optometric, or pediatric advice, services, or treatments to patients who remain less than 24 hours. (See Section 2.3, *Department of Public Health*, for description of licensing.) A brief description of the clinic typology provided in Health and Safety Code (H&SC), sections 1200 et seq., follows:

- **Primary Care Clinics** include community clinics and free clinics, both of which are required to be operated by a tax-exempt, nonprofit corporation.[4]

- **Psychology Clinics** provide psychological advice, services, or treatment to patients under the direction of a clinical psychologist, and are operated by a tax-exempt, nonprofit corporation; any charges to the patient follow a sliding fee scale based on the patient's ability to pay.

- **Specialty** C**linics** include surgical clinics, chronic dialysis clinics, rehabilitation clinics, and alternative birth centers, defined as:

    - Surgical Clinics—not part of a hospital that provide outpatient surgical care.[5]

    - Chronic Dialysis Clinics—provide outpatient treatment for patients with end-stage renal disease, including renal dialysis services.

    - Rehabilitation Clinics—provide direct medical services as well as at least two of the following rehabilitation services: physical therapy, occupational therapy, social, speech pathology, and audiology services.

    - Alternative Birth Centers—provide comprehensive perinatal services and delivery care to pregnant women.

Additionally, under H&SC section 1250, certain hospital outpatient services in a freestanding building are classified as OSHPD 3. These facilities provide the same services as primary and specialty care clinics per

[3] OSHPD issued a Code Application Notice (CAN) 1-7-2100 to assist in determining which jurisdiction has authority over plan review, certification, and construction inspection of clinic facilities. Facilities Development Division, "Plan Review, Building Inspection, and Certification of Surgical Clinics, Chronic Dialysis Clinics and Outpatient Services Clinics," Code Application Notice 1-7-2100, Office of Statewide Health Planning and Development, March 3, 2014, http://www.oshpd.ca.gov/FDD/Regulations/CANs/2013/1-7-2100.pdf.

[4] The distinction between "community clinic" and "free clinic" is that the former may charge patients based on ability to pay, utilizing a sliding scale, and the latter is precluded from charging patients directly for services or goods (e.g., medicine, drugs, or appliances).

[5] "Surgical clinic" does not include a clinic operated by one or more physicians in individual or group practice; however, physicians or dentists may apply for licensure (and hence be subject to OSHPD 3 standards).

H&SC section 1204.9 and have restrictions relative to the percentage of inpatient services provided at the facility.

Offices of private physicians in individual or group practices are not considered licensed clinics, and therefore are not subject to OSHPD 3 requirements. Department of Public Health

The California Department of Public Health (CDPH), a department of the HHSA, is responsible for ensuring health care facilities comply with State laws and regulations through its Licensing and Certification Division. Primary care clinics, psychology clinics, and specialty clinics are licensed by CDPH pursuant to H&SC section 1200 et seq. Hospital outpatient services in a freestanding building are licensed by CDPH pursuant to H&SC section 1250 (i.e., under a hospital license). As noted above, OSHPD 3 facilities are defined as clinics and outpatient facilities that are subject to CDPH licensing. A condition of licensing is written certification by OSHPD or the local enforcing agency stating design drawings, specifications, and/or construction are in compliance with CBSC requirements.

2. Regulatory Setting and Background

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3. Environmental Setting

3.1 PROJECT LOCATION

The proposed change to the CMC for OSHPD 3 outpatient clinics is a statewide regulatory change. As such, the project area is the State of California (refer to Figure 1). The project would affect additions or alterations to existing outpatient clinics as well as new clinics through both new construction and conversion of building spaces. However, this Initial Study will not involve the assessment of any specific project that involves direct construction or modification to structures. That is, the environmental review is not location dependent. The following sections provide information on the location and types of existing clinics in California.

3.1.1 Existing OSHPD 3 Clinics

Based on available data, there are approximately 1,850 clinics in California. The State is divided into 14 Health Service Areas (see Figure 1, *Health Service Areas*), and Table 2 breaks out the number of OSHPD 3 clinics by Health Service Area. The table does not include freestanding hospital buildings providing outpatient services.

Table 2 OSHPD 3 Clinics by Health Service Area: 2014

Health Service Area	Number of Clinics
Northern California	94
Golden Empire	97
San Francisco Bay Region North Bay, West Bay, East Bay, and Santa Clara Health Service Areas	374
North San Joaquin	92
Mid-Coast	70
Central	164
Santa Barbara/Ventura	72
Los Angeles	508
Inland Counties	120
Orange	101
San Diego/Imperial	156
Total	1,848

Source: Office of Statewide Health Planning and Development, Healthcare Information Division. Primary Care Clinics Licensed as of December 31, 2014. http://www.oshpd.ca.gov/HID/Products/FacilityList/PCListing_Dec2014.xl.

As described in Section 2.2.2, *OSHPD 3 Clinic Categories*, clinics are divided into three groups: primary care, specialty care, and psychology clinics. Additionally, OSHPD 3 requirements apply to certain hospital outpatient services in a freestanding building. Table 3 provides information on the number of clinics statewide, by type.

3. Environmental Setting

Table 3 OSHPD 3 Primary and Specialty Clinics by Type

Type of Clinic[1]	Classification	Number
Primary Care Clinic	Community Clinic	1,224
	Free Clinic	42
Psychology Clinic		24
Specialty Clinic	Chronic Dialysis	522
	Surgical	33
	Rehabilitation	12
	Alternative Birth Center	8
Total		1,865

Source: OSHPD 2015, https://www.alirts.oshpd.ca.gov/AdvSearch.aspx, accessed February 9, 2015.
1 Includes some freestanding hospital buildings providing outpatient services.

As shown, there are between 1,848 and 1,865 OSHPD 3 facilities in California, with primary clinics the predominant type (approximately 68%), followed by chronic dialysis clinics (approximately 8%). Alternative birthing centers and rehabilitation clinics account for the smallest portion of OSHPD 3 clinics.[6] The CSCB applies to construction of any health facilities, including construction, reconstruction, alteration, or repair. It is not anticipated that the project would largely affect existing facilities, unless undergoing alteration or reconstruction requiring new or significant changes to ventilation systems. This is because clinics are currently required to have fully ducted return air systems, and these facilities would not reasonably be expected to replace existing return ducting for plenum return air systems.

3.1.2 New OSHPD 3 Clinics

The proposed CMC change is expected to predominantly apply to new clinics of all types provided through new construction and conversion of existing buildings. It is difficult to project how many new clinics are anticipated over the next several years and hence subject to these changes. Approximately 44% of the State's population lives in a Primary Care Shortage Area, which relates to federal poverty levels and the ratio of primary care physicians to population. An increase in community-serving primary and specialty clinics is an element of providing greater access to health care in California.

6 In comparing Tables 2 and 3, there is a slight discrepancy. Table 3 may be more accurate because it summarizes a "real time" sort of clinic by type currently with "open" license status in the OSHPD Automated Licensing Information and Report Tracking System (ALIRTS) database.

Figure 1 - California Health Service Areas

3. Environmental Setting

Source: OSHPD, 2014

3. Environmental Setting

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4. Project Description

4.1 PROJECT BACKGROUND

During the adoption cycle for the 2013 triennial code, OSHPD proposed changes that included allowance for plenum return for certain clinics. The change was not adopted by the Commission. In April 2015, OSHPD distributed an Initial Study, *Proposed Statewide Regulations Allowing the Use of Plenum Return Air and Flexible Ducting in Certain Areas of OSHPD 3 Clinics*. The study evaluated proposed changes to Chapter 4, Ventilation Air Supply, and Chapter 6, Duct Systems, of the 2016 California Mechanical Code, CCR Title 24. The proposed changes would have allowed: 1) plenum return air in certain areas of OSHPD 3 clinics where fully ducted air return is now required by current code; and 2) greater than 10 feet of flexible ducting in certain areas of OSHPD 3 clinics where no more than 10 feet of flexible ducting is currently allowed. Subsequent to release of the Initial Study, OSHPD revised the project to address only the plenum air return proposal, the subject of this document.

4.2 PROJECT DESCRIPTION

OSHPD is proposing changes to Chapter 4, Ventilation Air Supply, in the 2016 California Mechanical Code, CCR Title 24, Part 4, to allow plenum return air in certain areas of OSHPD 3 clinics where fully ducted air return is now required by current code. The proposed regulatory change applies only to OSHPD 3 outpatient clinics and would not apply to facilities providing inpatient services.

The following relevant text is excerpted from "The Initial Express Terms for Proposed Building Standards of the Office of Statewide Health Planning and Development Regarding Proposed Changes to California Mechanical Code California Code of Regulations, Title 24, Part 4" (Initial Express Terms). The proposed changes to the regulations are shown with proposed additions in *underlined italics.* (Note: *italics* denote existing changes to model code.) The entirety of the Initial Express Terms is provided in Appendix A.

> **407.4.1.4** No space above a ceiling may be utilized as an outside-air, relief-air, supply-air, exhaust-air, or return-air plenum.
>
> ***Exceptions:***
> *(1) Designs specifically approved by the enforcing agency.*
> *(2) Return air plenums shall be permitted for* ***[OSHPD 3]*** *provided that spaces listed in Table 4A that have required pressure relationships shall be served by fully ducted supply, return, and exhaust systems. The following additional surgery and critical-care patient-care areas that do not require a pressure relationship shall also be served by fully ducted supply, return, and exhaust systems: (1) Recovery Rooms, (2) Treatment Rooms. In facilities that treat inpatients, mechanical systems shall utilize ducted systems for supply, return, and exhaust air.*

4.2.1 Discussion

Plenum Return Air

The proposed regulatory change to allow plenum return air would apply only to building areas with no air pressure requirements in relation to adjacent areas (e.g., administrative areas and exam rooms), as identified in Table 4-A of the CMC. The change would not apply to areas that require either positive air pressure or negative air pressure relative to adjacent areas (e.g., operating rooms and sensitive patient treatment areas). Further, the express terms except recovery and treatment rooms.

As discussed in Section 6.3, *Air Quality and Public Health*, positive air pressure is specified in some spaces in health facilities, such as operating and protective environment (PE) rooms, to prevent air flow into the rooms from adjacent spaces to maintain a sterile environment. Conversely, negative air pressure is required in some other clinic spaces, such as waiting rooms and airborne infection isolation (AII) rooms, to prevent air flow out of those rooms into adjacent spaces to minimize the spread of contaminants. The proposed regulatory change only applies to certain areas where negative or positive pressure is not required.

Further, pursuant to H&SC section 129725(b)(1), freestanding hospital buildings providing outpatient services can provide up to 25% of services to inpatients (i.e., persons whose stay is anticipated to be more than 24 hours). *Standard 170-2103* states that inpatient facilities are to be fully ducted. To address this difference, OSHPD limits the regulatory changes to outpatient clinics and facilities ("outpatient clinics") that do not provide inpatient services.

4.3 LEAD/RESPONSIBLE AGENCY APPROVALS

The Office of Statewide Health and Planning (OSHPD) is the lead agency under CEQA for this project. A public agency other than the lead agency that has discretionary approval power over a project is a "responsible agency," as defined by CEQA Guidelines, section 15381. The project requires adoption of the proposed regulation changes by the California Building Standards Commission; the Commission, therefore, is a responsible agency.

5. Environmental Checklist

5.1 PROJECT SUMMARY INFORMATION

1. **Project Title:** Proposed California Mechanical Code Change Allowing Plenum Return Air in Certain Areas of OSHPD 3 Clinics

2. **Lead Agency Name and Address:**
   Office of Statewide Health Planning and Development
   400 R Street, Suite 200
   Sacramento, CA 95811

3. **Contact Person and Phone Number:**
   Glenn S. A. Gall, AIA
   Project Manager
   916.440.8356 or Glenn.Gall@oshpd.ca.gov

4. **Project Location:** Statewide

5. **Project Sponsor's Name and Address:**
   Office of Statewide Health Planning and Development
   Facilities Development Division
   400 R Street, Suite 200
   Sacramento, California 95811
   916.440.8356

6. **General Plan Designation:** Not applicable; the project proposes a statewide regulation and is not site specific.

7. **Zoning:** Not applicable; the project proposes a statewide regulation and is not site specific.

8. **Description of Project:**
   OSHPD is proposing changes to Chapter 4, Ventilation Air Supply, to allow plenum return air in certain areas of licensed OSHPD 3 outpatient clinics where fully ducted air return is now required by current code. The proposed change would only apply to OSHPD 3 clinics providing outpatient services.

9. **Surrounding Land Uses and Setting:** Not applicable; the project is statewide regulatory change and not site specific.

10. **Other Public Agencies Whose Approval Is Required:**
    - California Building Standards Commission: adoption of proposed regulations.

5. Environmental Checklist

5.2 ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact," as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agricultural and Forest Resources	☐ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Geology/Soils
☐ Greenhouse Gas Emissions	☐ Hazards & Hazardous Materials	☐ Hydrology/Water Quality
☐ Land Use/Planning	☐ Mineral Resources	☐ Noise
☐ Population/Housing	☐ Public Services	☐ Recreation
☐ Transportation/Traffic	☐ Utilities/Service Systems	☐ Mandatory Findings of Significance

5.3 DETERMINATION (TO BE COMPLETED BY THE LEAD AGENCY)

On the basis of this initial evaluation:

☒ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature	*Date*
Glenn S.A. Gall, AIA	*Office of Statewide Health Planning and Development*

5.4 EVALUATION OF ENVIRONMENTAL IMPACTS

1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g. the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors, as well as general standards (e.g. the project would not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

2) All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3) Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

4) "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level.

5) Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:

   a) **Earlier Analyses Used.** Identify and state where they are available for review.

   b) I**mpacts Adequately Addressed.** Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.

   c) **Mitigation Measures.** For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts. Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated. A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

7) Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

5. Environmental Checklist

8) This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.

9) The explanation of each issue should identify:

   a) the significance criteria or threshold, if any, used to evaluate each question; and

   b) the mitigation measure identified, if any, to reduce the impact to less than significant.

This Initial Study addresses environmental concerns raised by commenters on a similar prior proposal to allow for plenum return air in certain OSHPD facilities and spaces. Concerns related to increased risk of infectious disease transmission and indoor air contaminants do not readily fit into the CEQA Checklist. Accordingly, Section 6.3, *Air Quality and Public Health,* and Section 6.8 *Hazards and Hazardous Materials*, each incorporate an additional question to address these concerns. Further, an additional question derived from Appendix G of the CEQA Checklist is incorporated in Section 6.17, *Utilities and Service Systems*, to evaluate expressed concerns that plenum return air would result in more energy consumption.

6. Environmental Analysis

6.1 AESTHETICS

Would the project:

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?				X
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?				X
c) Substantially degrade the existing visual character or quality of the site and its surroundings?				X
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?				X

Comments:

a) Have a substantial adverse effect on a scenic vista?

No Impact. Scenic vistas are panoramic views of natural or man-made features not available from most places—such as mountains, oceans or lakes, forests, or urban skylines. There would not be any direct impacts to scenic vistas because the project itself is a proposed regulatory change. Further, installation of plenum return air would occur inside the building envelope. Such installations would not affect scenic vistas, and no impact would occur.

b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

No Impact. The project is a proposed regulation change related to plenum return air. Installation of plenum return air pursuant to the proposed change would occur inside the building envelope and would not be visible from the exterior (or in fact the interior). No impact would occur.

c) Substantially degrade the existing visual character or quality of the site and its surroundings?

No Impact. The project is a proposed regulation change related to plenum return air, and there would not be any direct impacts to existing visual characteristics. The project would allow for changes within the plenum by eliminating the requirement for fully ducted return air in certain rooms and would occur within the building envelope. Installation of plenum return air as compared to fully ducted return under the current code would

not result in any discernable change to the building exterior. The project, therefore, would not degrade the existing visual character of clinics or their surroundings. No impact would occur.

d) Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?

No Impact. The project is a proposed regulation change related to plenum return air in certain areas of OSHPD 3 clinics. No sources of light or glare would be introduced if a plenum return air system is used as compared to the current requirement for fully ducted systems. Therefore, the project would have no impact on light or glare.

6.2 AGRICULTURE AND FORESTRY RESOURCES

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.

Would the project:

Issues		Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a)	Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?				X
b)	Conflict with existing zoning for agricultural use, or a Williamson Act contract?				X
c)	Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?				X
d)	Result in the loss of forest land or conversion of forest land to non-forest use?				X
e)	Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?				X

Comments:

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

No Impact. The proposed project is a regulatory change and is not site specific. Thus, the project would not directly convert farmlands to non-agricultural use. Moreover, the design of ventilation systems in affected OSHPD 3 facilities would not reasonably be expected to be a factor in siting future clinics to be developed through new construction. Conversion of existing buildings to OSHPD 3 outpatient clinics would not affect agricultural lands. Therefore, the project would not directly or indirectly cause conversion of farmland to non-agricultural use. No impact would occur.

b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?

No Impact. Williamson Act contracts restrict the use of privately owned land to agriculture and compatible open-space uses under contract with local governments; in exchange, the land is taxed based on actual use rather than potential market value. The project is not site specific, and implementation of the project would have no direct impact on facility siting. To the extent that new construction of OSHPD 3 outpatient clinics conflicts with existing zoning or Williamson Act contracts, those impacts would be evaluated on a project-specific basis. As discussed above, the design of ventilation systems would not reasonably be expected to be a factor in siting future clinics to be developed through new construction. Further, conversion of existing buildings to OSHPD 3 outpatient clinics poses no conflicts with existing agricultural uses as the property has already been committed for developed use. Therefore, no indirect impacts would occur.

c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?

No Impact. As discussed above, the project is not site specific and therefore would not conflict with existing zoning or cause rezoning of forest land or timberland. The design of ventilation systems would not reasonably be expected to be determinative in siting facilities, and new construction and conversion of existing outpatient clinics would not impact forest lands. No impact would occur.

d) Result in the loss of forest land or conversion of forest land to non-forest use?

No Impact. See Section 3.2(c) above. Work in accordance with the proposed project would not directly convert forest land to non-forest use, and the choice of ventilation design upon project implementation would likewise not impact facility siting. No impact would occur.

e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

No Impact. Installations pursuant to the proposed project would not directly or indirectly result in conversion of mapped important farmland to non-agricultural uses for the same reasons presented in Section 3.2(a) above. No impact would occur.

6.3 AIR QUALITY AND PUBLIC HEALTH

As discussed in Section 5.4, *Evaluation of Environmental Impacts*, this Initial Study includes questions developed specifically to address the unique characteristics and concerns expressed related to this project. Question (f) below provides a framework to evaluate concerns raised by commenters about the increased risk of infectious disease transmission and potential propagation of environmentally sourced contaminants, such as mold, in plenum return air systems.

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Conflict with or obstruct implementation of the applicable air quality plan?				X
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?				X
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?				X
d) Expose sensitive receptors to substantial pollutant concentrations?				X
e) Create objectionable odors affecting a substantial number of people?				X
f) Would the project cause or substantially contribute to increased risk of infectious disease transmission or other diseases from environmental sources in outpatient clinics?			X	

Comments:

a) Conflict with or obstruct implementation of the applicable air quality plan?

No Impact. The project is a proposed regulation change to allow for plenum return air in certain areas of OSHPD 3 outpatient clinics. Installation of plenum return air pursuant to the project would occur inside the building envelope. Any such work would not differ substantially from the same work without the project, with respect to implementation of air quality plans. The only difference would be the elimination of ducting for return air in certain spaces of clinics. No impact would occur.

b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?

No Impact. The proposed project is the adoption of regulations regarding plenum return air in certain areas of OSHPD 3 outpatient clinics. Use of plenum return air would differ from current code requirements by eliminating the need for a fully ducted return air system in permissible spaces. The project would have no impact on air quality standards or existing or projected air quality violations.

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

No Impact. The proposed project is the adoption of regulations regarding plenum return air in certain areas of OSHPD 3 outpatient clinics. Use of plenum return air would differ from current code requirements by eliminating the need for a fully ducted return air system in permissible spaces. The project would have no impact on emissions of criteria pollutants. No impact would occur.

d) Expose sensitive receptors to substantial pollutant concentrations?

No Impact. Sensitive receptors are facilities that house or attract children, the elderly, people with illnesses, and others who are especially sensitive to the effects of air pollutants. This question addresses the impact of a project on sensitive receptors and is generally evaluated in terms of emission of toxics, odors, and criteria pollutants either from existing land uses or a proposed project in concentrations that pose a health risk to sensitive receptors. The allowance for plenum return air in certain spaces would not result in increased pollutant concentrations during operation or construction of OSHPD 3 outpatient clinics as compared to fully ducted return air systems. Further, the provision of plenum would not result in releases of odors or toxics into the environment. Therefore, the project would not expose sensitive receptors to substantial outdoor pollutant concentrations, and no impact would occur. (The potential for the project to expose persons to indoor air contaminants (i.e., infectious disease and mold) is discussed in Section 6.3 (f), below.)

e) Create objectionable odors affecting a substantial number of people?

No Impact. The type of facilities that are considered to have objectionable odors include wastewater treatments plants, compost facilities, landfills, solid waste transfer stations, fiberglass manufacturing facilities, paint/coating operations (e.g., auto body shops), dairy farms, petroleum refineries, asphalt batch plants, chemical manufacturing, and food manufacturing facilities. Clinics are not among the land uses that generate objectionable odors. There is no evidence that allowance of plenum return air would impact odors within outpatient clinic environments. There is the potential for odors from restrooms to migrate into health clinic space if they are not maintained under negative pressure and exhausted directly to the outdoors, as required in the 2013 Mechanical Code.[7] Other rooms that exhaust to the outdoors to minimize the potential for odor migration are laboratories, soiled linen rooms, laundry rooms, sterilization rooms, anesthesia storage, and

[7] National Institute for Occupational Safety and Health, "Indoor Environmental Quality Evaluation at a Health Clinic: Indiana," by Loren Tapp, Douglas Wiegand, and Gregory Burr, Health Hazard Evaluation Report HETA No. 2010-0168-3136 (Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, July 2011), iii, 4.

post-anesthesia care units. However, these issues are not associated with ducting or plenum space. Further, there is no evidence that infectious diseases or environmentally-sourced diseases (e.g., derived from fungi) are more likely to be present in plenum return air systems versus fully ducted return systems. As discussed in Section 6.3(f), in fact, plenum spaces with lower humidity and no insulation materials may have lower levels of potential environmental contaminants, such as mold, compared to fully ducted return air. Ventilation requirements included in the CMC, notably the number of air exchanges per room by type, are designed in part to control odors and comfort.[8] Further, section 413.0 of the CMC, as described in Section 6.3(f), requires rooms where excess heat or moisture is present, or objectionable odors or dust, to have exhaust ventilation to change the air a minimum of ten times per hour. Experience over recent decades indicates that complaints about odor and sensory comfort are reasonably controlled with the current ASHRAE Standard 62.[9] The proposed project would not impact these requirements, and no change is anticipated with the introduction of plenum return air in certain spaces of outpatient clinics. No impact would occur.

f) Would the project cause or substantially contribute to increased risk of infectious disease transmission or other health impacts within outpatient clinics?

Public comments received by OSHPD regarding similar changes proposed to the 2013 CMC included the assertion that the changes would increase health and safety risks related to indoor air quality and infectious diseases. Commenters expressed concern that allowing return air plenum spaces could lead to greater sources or amplification sites for airborne pathogens and other contaminants, such as mold, compared with fully ducted ventilation systems. This section describes how the proposed code change pertains to the potential for airborne transmission of diseases through the HVAC system. The Regulatory Setting describes applicable codes and standards. The Environmental Setting describes infectious diseases spread from person to person and diseases from environmental sources (e.g., fungi) that may be of concern in health care facilities. The Impact Analysis addresses the potential for the project to cause or contribute substantially to infectious disease transmission or health impacts related to other indoor air contaminants.

Regulatory Setting

FEDERAL PLANS, POLICIES, REGULATIONS AND LAWS

Occupational Safety and Health Administration (OSHA)

Section 5(a)(1) of the Occupational Safety and Health Act requires employers to provide their employees with a workplace that is free of recognized hazards likely to cause death or serious physical harm. The OSHA Technical Manual, Section III, Health Hazards, Chapter 2, Indoor Air Quality Investigation, classifies microbes—including viruses, fungi, mold, bacteria, nematodes, amoeba, pollen, dander, and mites—as indoor air quality contaminants. Currently, OSHA has no indoor air quality standards. The Manual provides guidelines to employers on how to respond to employee complaints regarding indoor air quality, including recommendations for investigating and preventing or alleviating indoor air quality problems.

[8] ASHRAE, *HVAC Design Manual for Hospitals and Clinics,* 2nd ed. (Atlanta, GA: ASHRAE, 2013).

[9] American Thoracic Society, "Achieving Healthy Indoor Air," supplement of the American Thoracic Society Workshop, Santa Fe, New Mexico, *American Journal of Respiratory and Critical Care Medicine* 156, no. 3, part 2 (1997): S48.

STATE PLANS, POLICIES, REGULATIONS, AND LAWS

Aerosol Transmissible Diseases Standard (CCR Title 8, Section 5199)

The California Department of Industrial Relations enforces regulations governing workplace safety and health through its Division of Occupational Safety and Health (Cal/OSHA). In 2009, Cal/OSHA issued the Aerosol Transmissible Diseases Standard to mitigate occupational exposures to pathogens transmitted via aerosols and droplets. The standard was the first such regulation in the nation and applies mainly to health care facilities, services, or operations. The regulations specify that employers must implement an effective program to minimize exposure of employees to aerosol transmitted diseases (ATD). Appendix A of the standard contains a list of diseases and pathogens which are considered aerosol transmissible pathogens or diseases for the purpose of the regulatory controls.

California Mechanical Code (CMC) (CCR Title 24, Part 4)

Codes pertinent to the project, including OSHPD-specific requirements, are identified and briefly summarized below. Tables referenced in the code sections (i.e., Table 4-A and 4-B) are provided in Appendix B. Table 4-A identifies air pressure relationships within each space, minimum air changes, and exhaust requirements. Table 4-B shows requirements for number of filter banks and efficiencies.

Chapter 4 - Ventilation Air Supply

407.0 Ventilation System Details. [OSHPD 1, 2, 3 & 4]

407.1.1 This section requires supply-air, return air and exhaust-air systems to be mechanically and continuously operated for areas listed in Table 4-A. Natural ventilation through windows or other openings is supplemental, but shall not be used in airborne infection isolation rooms or protective environment rooms. Further, air changes may be reduced to 25% of the value in Table 4-A when the room is unoccupied, except the number must be reestablished when the space is occupied, and pressure relationship with surrounding rooms is maintained when air changes per area are reduced. Ventilation shall not be reduced in rooms specifically used for airborne infection control, such as waiting rooms, triage rooms, corridors, reception areas, adjacent waiting areas, airborne infection isolation rooms, and protective environment rooms, among others.

407.1.2 Exhaust fan must be located at the discharge end of the system.

407.3 Air Balance. Ventilation systems must be designed and balanced to provide the general air balance relationship to adjacent areas in Table 4-A. Where the static pressure drop across filters is a significant portion of the total pressure, differential controls or constant volume devices may be required to ensure maintenance of air balance requirements.

407.4 Air Circulation. Design of ventilation systems is required to move air from clean to less clean areas, subject to specific requirements regarding placement of air supply and exhaust or recirculation inlets. Corridors may not be used to convey air to and from any room except for small rooms, e.g., toilet rooms, which are mechanically exhausted. The use of space above a ceiling may not be used as outside-air, relief-air, supply-air, exhaust-air, or return-air plenum, excepting designs specially approved by the enforcing agency. Air

from patient, exam, and treatment rooms must pass through air filters, as required in Table 4-B before transfer to similar rooms.

408.0 Filters. [OSHPD 1, 2, 3 & 4] Filters' efficiencies are to be certified by the manufacturer to comply with ASHRAE standards for testing air cleaning devices. Up to three banks of filters are required in certain rooms, as identified in Table 4-B. Where multiple filters are required, filter bank No. 1 is located upstream of air-conditioning equipment, and banks No. 2 and 3 are downstream of the supply fan and cooling and humidification equipment. Protective environment rooms are required to have three banks, with Minimum Efficiency Reporting Value (MERV) of 99.97%. In contrast, administrative, staff support, storage and soiled holding areas are required to only have one filter with 30% MERV.

413.0 Odorous Rooms. [OSHPD 1, 2, 3 & 4] Rooms where excess heat or moisture is present, or objectionable odors or dust, are required to have exhaust ventilation to change the air a minimum of ten times per hour (413.1).

414.0 Airborne Infection Isolation Rooms. [OSHPD 1, 2, 3 & 4] A separate, dedicated exhaust system is required for airborne infection isolation rooms. Exhaust shall discharge above room level and be a minimum of 25 feet from areas that may be occupied, doors, operable windows, and intakes. A HEPA filter with 99.97% minimum efficiency must be located upstream of the exhaust fan. The section also specifies location of supply and exhaust air to prevent stagnation and minimize exposure of health care workers to airborne infectious particles.

415.0 Protective Environment Rooms. [OSHPD 1, 2, 3 & 4] Supply and exhaust outlets and inlets are located to provide airflow/prevent stagnation and eliminate short circuiting of supply to exhaust or return. This section specifies the location of outlets and inlets.

416.0 Alarms – Airborne Infection Isolation rooms and Protective Environment Rooms. [OSHPD 1, 2, 3 & 4] An alarm system is required for each isolation room to annunciate when supply, return, or exhaust fans are interrupted and when either the minimum air quality difference required by Table 4-A is not maintained, or the minimum pressure of water and minimum air velocity of 100 feet are not being maintained at the air transfer opening as required by Table 4-A.

417.0 Testing and Balancing Airborne Infection Isolation Rooms and Protective Environment Rooms. [OSHPD 1, 2, 3 & 4] All mechanical systems must be tested, balanced, and operated to demonstrate installation and performance of the systems.

Chapter 5 - Exhaust Systems

504.1 Makeup and Exhaust-Air Ducts. Exhaust ducts under positive pressure shall not extend into or through ducts or plenums. Exhaust ducts shall terminate outside the building and must have back-draft dampers, except when exhaust fans must operate continuously.

Chapter 6 - Duct Systems

604.0 Insulation of Ducts

604.1 General. This section requires supply-air ducts, return-air ducts, and plenums of heating or cooling systems to be insulated to achieve the minimum thermal (R) value in accordance with SMACNA HVAC Duct Construction Standards – Metal and Flexible. [OSHPD 1, 2, 3 & 4] Cold air ducts shall be insulated wherever necessary or to prevent condensation. Approved materials shall be installed within ducts and plenums for insulation, sound deadening, or other purposes. Materials shall have a mold, humidity, and erosion-resistance surface.

604.2. [OSHPD 1, 2, 3 (surgical clinics) & 4] Thermal acoustical lining may not be installed in ducts, boxes, sound traps and other in-duct systems serving specified areas unless terminal filters with 90% average efficiency or MERV 14 are installed downstream of the duct lining.

Environmental Setting

This section describes airborne infectious diseases, with a focus on those that could be spread through a HVAC system, including statistics related to diseases spread within ambulatory care centers. Airborne transmission of pathogens from environmental sources (i.e., mold) are then discussed. The Environmental Setting discussion concludes with a description of existing administrative and environmental controls in health care facilities aimed at preventing the spread of disease.

AIRBORNE TRANSMISSION OF DISEASES

The potential for the airborne transmission of disease is widely recognized, but there remains uncertainty regarding how diseases are spread (i.e., whether it is airborne, short range droplets, direct or indirect contact, or multimodal, a combination of mechanisms).[10] This discussion focuses primarily on the spread of infectious diseases by small airborne particles, or aerosols, which could be carried through an HVAC system. As described further on in this section, four diseases are identified to be of concern as related to this project.

Classification of Infectious Diseases

The US Centers for Disease Control and Prevention (CDC) classifies the transmission of infectious diseases into three categories: contact, droplet and airborne.[11] Contact transmission, the most common mode of transmission, is further divided into direct and indirect contact. Direct contact occurs when microorganisms are transferred directly from an infected person to another person via touching, kissing, sexual contact, or contact with bodily fluids, including blood, urine, stool, and respiratory secretions. Examples of direct contact diseases include the common cold, conjunctivitis (pink eye), herpes simplex virus, and sexually transmitted diseases. Indirect transmission involves the transfer of an infectious agent through a contaminated intermediate object, surface, or person, known as a fomite. Examples of indirect contact transmission include the contaminated hands of health care personnel with inadequate hand washing between

[10] ASHRAE, "Position Document on Airborne Infectious Diseases" (Atlanta, GA: ASHRAE, 2014), 3.

[11] Centers for Disease Control and Prevention (CDC), *2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings*, by Jane Siegel et al., Healthcare Infection Control Practices Advisory Committee, 2007, 15.

patients; endoscopes or surgical equipment that are not properly cleaned between patients; and shared toys in waiting rooms among pediatric patients.[12]

Infectious diseases can also be transmitted through the air and spread person to person by two modes: droplet transmission and airborne transmission.[13] Droplet transmission is typically a form of contact transmission and occurs when an infected person coughs, sneezes, or talks and respiratory droplets are generated. These droplets typically travel only short distances ($\leq$ 3 feet) before falling to the ground, although smallpox and severe acute respiratory syndrome (SARS) droplets may travel up to 6 feet or more.[14] Therefore, in order for infection to occur, a susceptible individual must be close enough to the infected individual for the droplet to make contact with the susceptible individual's respiratory tract, eyes, mouth, or nasal passages. Examples of infectious agents that are transmitted via the droplet route include the common cold, influenza, meningitis, mumps, pertussis, strep throat, and pneumonia. Organisms transmitted via the droplet route do not remain infective over long distances and do not require special air handling and ventilation, according to the CDC.[15]

Airborne transmission is characterized by small particles—generally less than 10 μm in diameter—that remain airborne for extended periods and can be transported long distances.[16] These small airborne particles are defined variously as aerosols, airborne, and droplet nuclei. Airborne infectious diseases are the focus of this discussion since they can be transmitted via HVAC systems, and these systems are not known to entrain the larger droplet particles.[17] Infectious agents transmitted via the airborne pathway include tuberculosis, measles, and chickenpox.[18] Although SARS is transmitted primarily via contact or the droplet route, it has been suggested, though not proven, that airborne transmission may occur over a limited distance (e.g., within a room).[19] However, since SARS is unlikely to be transmitted through an HVAC system, and there have been no reported cases anywhere in the world since 2004, SARS is not subject to further evaluation.[20] Some data suggest the possibility that smallpox can be transmitted over long distances through the air under unusual circumstances.[21] However, the last case of smallpox in the United States was in 1949, and the disease has been eradicated through a successful worldwide vaccination program.[22] Therefore, smallpox is also eliminated from further consideration.

12 Ibid., 16.

13 Ibid., 15.

14 Ibid., 17.

15 Ibid., 18.

16 ASHRAE, "Position Document," 3.

17 Ibid.

18 Ibid., 18.

19 Ibid., 19.

20 CDC, "Severe Acute Respiratory Syndrome (SARS)," http://www.cdc.gov/sars/index.html.

21 CDC, *2007 Guidelines,* 18.

22 California Department of Public Health (CDPH), "Smallpox," modified 12/24/2012, https://www.cdph.ca.gov/HEALTHINFO/DISCOND/Pages/Smallpox.aspx.

ATD of Potential Concern

A brief discussion of the four diseases that could be transmitted via airborne routes and possibly through HVAC systems in OSHPD 3 clinics is provided below. Information on infectious diseases eliminated from consideration for the purpose of this Initial Study is provided in Appendix C, *Rationale for Elimination of Certain ATD in Initial Study Evaluation*. The Appendix identifies the universe of diseases evaluated and the methodology for determining which ones were of concern based on reasonable potential for airborne transmission in OSHPD 3 outpatient clinics.

Chickenpox

Chickenpox, also called varicella, is a common childhood disease that is usually mild, but can be serious in young infants and adults.[23] The chickenpox virus (*Varicella zoster)* can be spread from person to person through the air or by contact with fluid from chickenpox blisters. The virus is present in droplet nuclei, which range in size from 1 to 5 μm in diameter and can remain suspended in the air for several hours and carried over considerable distances.[24]

Symptoms include high fever, fatigue, loss of appetite, and headache followed by a rash that first shows up on the face, chest, and back and spreads to the rest of the body, turning into itchy, fluid-filled blisters that eventually turn into scabs. Chickenpox is contagious from one to two days before the rash forms and continues until all of the blisters turn into scabs. The incubation period is 10 to 21 days after exposure. The chickenpox vaccine is the best protection against getting the disease. It is 90% effective in preventing infection, and of the 10% of vaccinated individuals who do get chickenpox, it is usually a very mild case lasting only a few days. Proof of vaccination or evidence of immunity for all children aged 18 months or older is required for licensed child care centers and for all children entering a California school at kindergarten or transferring to a California school at any grade.[25] There were 31 cases of chickenpox that involved hospitalization in California in 2013.[26]

Measles

Measles is a highly contagious viral disease that starts with a fever that lasts for a couple of days, followed by a cough, runny nose, conjunctivitis (pink eye), and a rash.[27] The rash typically appears first on the face and behind the ears, and then affects the rest of the body. Infected individuals are contagious from four days before the rash starts to about four days afterward. The incubation period ranges from 7 to 21 days. The measles virus can live for up to two hours in an airspace where the infected person has coughed or sneezed and can be spread through contaminated air.[28] In December 2014, a large outbreak of measles occurred in California when at least 40 people who visited or worked at Disneyland in Orange County contracted measles

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23 CDPH, "Varicella (Chickenpox)," modified 9/23/2014, https://www.cdph.ca.gov/HEALTHINFO/DISCOND/Pages/Varicella.aspx.

24 Medical Advisory Secretariat, "Air Cleaning Technologies: An Evidence-Based Analysis," *Ontario Health Technology Assessment Series* 5, no.17 (2005): 6.

25 This requirement is subject to personal belief exemption and medical exemption. See CDPH, "Varicella."

26 CDPH, "Vaccine-Preventable Disease Surveillance in California," 2013 Annual Report, 13.

27 CDPH, "Measles," modified 5/15/2015, http://www.cdph.ca.gov/HealthInfo/discond/Pages/Measles.aspx.

28 CDC, "Transmission of Measles," modified 3/31/2015, http://www.cdc.gov/measles/about/transmission.html.

and spread the disease to at least a half dozen other states.[29] The outbreak was declared to be over on April 17, 2015. The disease can be prevented by vaccine, which is 97% effective. Children routinely get their first dose of MMR (measles, mumps, and rubella) at 12 months, with a second dose of MMR before beginning kindergarten. Since December 2014, there have been 134 confirmed measles cases in California, with 11 exposed in a community setting (e.g., emergency room) where a confirmed case was known to be present.[30] The California Department of Public Health (CDPH) has published infection control recommendations for patients who are suspected of having measles.[31]

Influenza

Influenza (flu) is a contagious respiratory illness caused by various influenza viruses. The infection can be spread by healthy adults beginning one day before symptoms develop and up to five to seven days after becoming sick.[32] Symptoms begin one to four days after the virus enters the body. Classic symptoms include the abrupt onset of fever, myalgia, sore throat, nonproductive cough, and headache. Additional symptoms may include runny nose, headache, chest burning, and ocular symptoms, such as eye pain and sensitivity to light.[33] Symptoms and fever typically last from two to three days, but rarely more than five days. The most frequent complication of influenza is pneumonia, but can include bronchitis, sinus infections, and ear infections. Death is reported in less than 1 in 1,000 cases, with most deaths occurring among people 65 years of age or older. Complications may occur in older adults, young children, or people with chronic health problems.

CDPH recommends a yearly flu vaccine for everyone over 6 months of age as the first and most important step in preventing this disease. Since the virus strains vary from year to year, the effectiveness of the vaccine depends on the "match" between the flu viruses in the vaccine and the flu viruses spreading within the community, and the age and health of the person being vaccinated.[34]

Influenza is primarily transmitted from person to person via droplets generated when infected people cough or sneeze.[35] Airborne transmission via small-particle aerosols in the vicinity of the infected individual may also occur. Although airborne transmission over longer distances, such as from one patient room to another, is not thought to occur, there is some evidence that influenza can be spread via the airborne pathway.[36] A systematic review of 40 studies associating building ventilation and the transmission of airborne infections did not show conclusive evidence of influenza transmission in a health care setting. However, there was conclusive evidence of influenza transmission in a grounded aircraft that was without ventilation during a 3-

29 CPDH, "Measles."

30 CDPH, "California Measles Surveillance Update," April 10, 2015, https://www.cdph.ca.gov/programs/immunize/Documents/Measles_Update_4-10-2015_public.pdf.

31 CDPH, "Healthcare Facility Infection Control Recommendations for Suspect Measles Patients," March 2014, https://www.cdph.ca.gov/HealthInfo/discond/Documents/CDPHHCFacilityICRecsforSuspectMeaslesPatients.pdf.

32 CDC, "How Flu Spreads," modified 9/12/2013, http://www.cdc.gov/flu/about/disease/spread.htm.

33 Ibid.

34 CDC, "Vaccine Effectiveness: How Well Does the Flu Vaccine Work?" modified 1/14/2015, http://www.cdc.gov/flu/about/qa/vaccineeffect.htm.

35 CDC, "How Flu Spreads."

36 Y. Li et al., "Role of Ventilation in Airborne Transmission of Infectious Agents in the Built Environment: A Multidisciplinary Systematic Review," *Indoor Air* 17 (2007): 5.

hour period, with 72% of the passengers subsequently reported being infected by influenza.[37] Although the degree to which airborne transmission contributes to influenza infection is uncertain and has not been adequately studied,[38] it is included as a potential airborne disease in this discussion.

Tuberculosis

Tuberculosis (TB) is a disease caused by a bacterium, *Mycobacterium tuberculosis,* that usually attacks the lungs but can also affect the kidney, spine, and brain.[39] If not treated properly, it can be fatal. Symptoms of TB include weakness, weight loss, fever and night sweats, coughing, chest pain, and coughing up blood. It is spread through the air when an infected person coughs, sneezes, talks, or sings. These particles, called droplet nuclei, can remain suspended in the air for several hours.[40]

People who have prolonged contact with an infectious person are at highest risk of becoming infected, such as family members or coworkers. However, TB has been transmitted in health care settings when health care workers and/or patients come in contact with persons who have unsuspected TB disease. Treatment consists of a four-drug regimen that is taken for at least 6 months. The Bacille Calmette-Guerin (BCG) vaccine is used in other parts of the world. However, BCG vaccination is generally not recommended in the US because of the low risk of infection by TB and the variable effectiveness of the BCG vaccine against pulmonary TB.[41]

Latent TB infection indicates that the bacteria are in the body but the body's immune system is keeping the bacteria under control and inactive. People with latent TB are asymptomatic, are not infectious, and cannot spread the disease to other people.[42] However, without treatment, approximately 5% of people infected with *M. tuberculosis* will develop the disease in the first year or two after infection, and another 5% will develop the diseases sometime later in life. Thus, without treatment, approximately 10% of people with normal immune systems who are infected will develop TB at some point in their life.[43]

Environmental factors that increase the probability of TB transmission include the following:[44]

- Concentration of infection droplet nuclei—The more droplet nuclei in the air, the higher the probability that TB will be transmitted

- Space—Exposure in small, enclosed spaces increases the probability of transmission

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37 Ibid., 6.

38 CDPH, "Recommendations for the Prevention and Control of Influenza: California Long-Term Care Facilities," Center for Healthcare Quality, Healthcare-Associated Infections Program, December 2011, 4, https://www.cdph.ca.gov/programs/hai/Documents/Influenza-Recommendations-LTCF-v.12-11.pdf.

39 CDPH, "Tuberculosis," modified 2/2/2015, http://www.cdph.ca.gov/healthinfo/discond/Pages/Tuberculosis.aspx.

40 CDC, "TB Elimination: Tuberculosis: General Information," October 2011, http://www.cdc.gov/tb/publications/factsheets/general/tb.pdf.

41 CDC, *Core Curriculum on Tuberculosis: What the Clinician Should Know*, 6th ed., National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, Division of Tuberculosis Elimination, 2013, 67.

42 Ibid., 29.

43 Ibid., 30.

44 Ibid., 24.

- Ventilation—Inadequate local or general ventilation that results in insufficient dilution or removal of infectious droplet nuclei increases the likelihood of transmission
- Air circulation—Recirculation of air containing infectious droplet nuclei
- Specimen handling—Improper specimen handling procedures can generate infectious droplet nuclei
- Air pressure—Positive air pressure in an infectious patient's room can cause *M. tuberculosis* organisms to flow to other areas

The number of TB cases in the US peaked in 1992 and has been declining by 5% to 7% annually since that time.[45] There were 2,191 cases of TB reported in California in 2012, which represents a decrease of 5.6% compared to 2011.[46] However, California reported the largest number of cases in the US, representing 22% of the nation's total of 9,951 cases. The incidence rate of 5.8 cases per 100,000 population is also the third highest amount in states, following Alaska (9.0) and Hawaii (8.4).[47] The counties with the highest incidence rates of TB were Imperial County and San Francisco County. Only six of the 2,191 reported TB cases (0.3%) in California were reported to be health care workers, indicating that transmission in a health care setting is not common, but can occur. It is also possible that the health care workers contracted TB outside of the workplace setting via close contact with family members or relatives.

Ambulatory Care Settings and Infectious Disease Transmission

Ambulatory care now accounts for most patient encounters in the health care system.[48] Ambulatory care is provided by hospital-based outpatient clinics, non-hospital based clinics and doctor's offices, public health clinics, freestanding dialysis centers, ambulatory surgical centers, and urgent care centers. OSHPD 3 clinics fit this category because they include primary care clinics, psychology clinics, surgical clinics, dialysis centers, rehabilitation clinics, and alternative birth centers. These settings provide challenges because patients remain in common areas for long periods of time waiting to be seen by a health care provider, and immunocompromised patients are treated in dialysis centers.

There are very few studies on the risk of healthcare-acquired infections (HAIs) in outpatient (ambulatory care) centers, with the exception of kidney dialysis centers.[49] In contrast to inpatient hospital-acquired infections, infections transmitted in outpatient settings are neither systematically monitored nor likely to be detected by routine surveillance.[50] In one study of 53 infection clusters associated with outpatient settings, 29 clusters were associated with contaminated solutions or equipment (55%), 14 from person to person transmission (26%), and 10 were associated with airborne or droplet transmission among patients and health

45 Ibid., 4.

46 CDPH, "Report on Tuberculosis in California, 2012," Center for Infectious Diseases, Division of Communicable Disease Control, Tuberculosis Control Branch, July 2013, 2.

47 Ibid., 2.

48 CDC, *2007 Guidelines,* 35.

49 Ibid., 36.

50 Richard Goodman and Steven Solomon, "Transmission of Infectious Diseases in Outpatient Health Care Settings," 265: 2377.

care workers (19%).[51] Measles and tuberculosis were the two diseases spread via the airborne route. Measles was found to be spread at a pediatrician's office, and TB was spread at a health clinic. Although there are reports of chickenpox being spread in the pediatric wards of hospitals,[52] no incidences of the spread of this disease in a clinic setting were found. Similarly, no cases of influenza attributed specifically to outpatient health care settings were reported, although it is possible and probable that both of these diseases have been spread in clinic settings.

If transmission in outpatient settings is to be prevented, screening for potentially infectious individuals at risk for transmitting airborne diseases is necessary at the start of the initial patient encounter.[53] Upon identification of a potentially infectious patient, implementation of preventive measures, including prompt separation of the patient and implementation of appropriate control measures, such as respiratory hygiene/cough etiquette and transmission-based precautions, can decrease transmission risks. Airborne outbreaks are very unusual, because the more common spread of respiratory pathogens is via the droplet route, but these outbreaks do occur.[54]

In a countywide study, the Mayo Clinic reported that the top three reasons for visits to health care providers were skin disorders, osteoarthritis and joint disorders, and back problems.[55] Upper respiratory conditions, which may include some of the infectious diseases reported herein, were ranked number five in the list of frequent visits. The study found these rankings similar to that of the general US population. The remaining conditions, which are cholesterol problems; anxiety, depression, and bipolar disorder; chronic neurologic disorders; high blood pressure; headaches; and diabetes, are not infectious diseases. A book published by the Association for Professionals in Infection Control and Epidemiology (APIC) stated that although infectious diseases may account for 20% to 30% of physician office visits, an upper respiratory tract infection (i.e., common cold) was the most frequent reason for the visit.[56] It also was stated that although outbreaks of measles, TB, and other infectious diseases have been traced to physician offices or clinics, most of these outbreaks were associated with noncompliance with infection control (IC) procedures.[57]

AIRBORNE TRANSMISSION FROM ENVIRONMENTAL SOURCES

Some infectious agents are not spread from person to person but are present in the environment. For example, *Aspergillus* species are ubiquitous fungi that naturally occur in soil, water, and decaying vegetation. They produce spores that are present in the air we breathe and do not normally cause illness. They can be found outdoors (grass, hay, bird nests and bird droppings, cattle and horse manure, forest litter, and wood

51 Ibid.

52 Li et al., "Role of Ventilation," 13.

53 CDC, *2007 Guidelines,* 36.

54 Kathy Dix, "The Elusive Enemy: Airborne Pathogens in Healthcare Facilities," Infection Control Today: Clinical Update, August 1, 2005, http://www.infectioncontroltoday.com/articles/2005/08/infection-control-today-clinical-update.aspx.

55 Jennifer L. St Sauver et al., "Why Patients Visit Their Doctors: Assessing the Most Prevalent Conditions in a Defined American Population," 2013. Author's manuscript at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3564521/. See Discussion: Discussion of Principal Findings.

56 Candace Friedman and Kathleen H. Petersen, *Infection Control in Ambulatory Care* (Boston : Jones and Bartlett Publishers, 2004).

57 Ibid.

chips) and indoors (refrigerator and bathroom walls, basements, bedding, and house dust).[58] Because *Aspergillus* plays a prominent role in the natural decay process of leaves, wood, and other organic matter, exposure occurs with common activities such as walking in the woods or park, mowing or raking lawns, and gardening. Elevated concentrations of *Aspergillus* spores are associated with composting facilities.[59]

The entry of *Aspergillus* spores into health care facilities can occur via improperly functioning ventilation systems, air filters, open windows, and absorbent building materials, such as wallboard or ceiling tiles that become and remain wet.[60] Further, building renovation and construction activities can generate dust and release airborne fungal spores that can cause aspergillosis in immunocompromised patients.[61] Several studies have linked increased levels of atmospheric dust and fungal spores during renovation and construction activities with HAIs in immunocompromised patients. The most common species causing HAIs is *Aspergillosis fumigatus.*[62]

The symptoms of aspergillosis vary with the type of illness. People with asthmas or cystic fibrosis have an allergic reaction to *Aspergillus*, known as allergic bronchopulmonary aspergillosis, that causes fever, a cough that may bring up blood or mucus, and worsening asthma.[63] A growth of tangled fungus fibers (fungus ball) may develop in air spaces in the lungs in the condition known as simple aspergilloma. This occurs in people with pre-existing lung conditions, such as emphysema, TB, or advanced sarcoidosis. This condition may not produce symptoms or produce only a mild cough, but can worsen over time, causing a cough that brings up blood, wheezing, shortness of breath, weight loss, and fatigue.[64] Invasive pulmonary aspergillosis is the most severe form and occurs when the infection spreads from the lungs to the brain, heart, kidneys, or skin. Untreated, this form is usually fatal. Symptoms include fever and chills, cough that brings up blood, severe bleeding from the lungs, shortness of breath, chest or joint pain, headaches, nosebleed, facial swelling on one side, and skin lesions.[65]

Numerous outbreaks of *Aspergillus* infections have been reported in hospital settings, most commonly associated with construction or renovation projects and infection to immunocompromised patients.[66] A search of the literature did not find any information on the occurrence of *Aspergillus* infections in ambulatory care facilities.

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58 Sandra McNeel and Richard Kreutzer, "Bioaerosols and Green-Waste Composting in California." Final Report. (Oakland, CA: California Department of Health Services, Environmental Health Investigations Branch, June 1999), 2.

59 Ibid., 2.

60 CDC, *Guidelines for Environmental Infection Control in Health-Care Facilities: Recommendations from CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC)*, by L. M. Sehulster et al. (Chicago, IL: American Society for Healthcare Engineering/American Hospital Association, 2004), 8.

61 Ibid., 8.

62 Ibid., 8.

63 Mayo Clinic, "Diseases and Conditions: Aspergillosis," Mayoclinic.org, http://www.mayoclinic.org/diseases-conditions/aspergillosis/basics/symptoms/con-20030330.

64 Ibid.

65 Ibid.

66 Anjali Joseph, "The Impact of the Environment on Infections in Healthcare Facilities," Issue Paper #1 (Concord, CA: Center for Health Design, July 2006), 3.

Another disease caused by environmental factors is Legionnaires' disease. This is not technically transmitted by airborne mechanisms, but by the inhalation of aerosolized water that is contaminated with *Legionella* species. *Legionella* are species of gram-negative aerobic bacteria that are commonly found in aquatic environments.[67] Sources where temperatures allow the bacteria to thrive are hot water tanks, cooling towers, condensers of air-conditioning units, spas, showers, and humidifiers. Infection occurs when people inhale microscopic water droplets containing the bacteria, which might be from the spray of a shower, faucet, or whirlpool, or water dispersed through the ventilation system of a large building. The incubation period is typically two to ten days after exposure to the bacteria.[68]

Exposure can result in two illnesses. Pontiac fever is a milder flu-like illness with fever and muscle aches but no pneumonia. Legionnaires' disease is a form of atypical pneumonia with a high fever, headache, muscle pain, and chills, and may include cough with mucus and blood, shortness of breath, chest pain, gastrointestinal symptoms, and confusion or other mental changes.[69]

There are been several outbreaks of Legionnaires' disease in hospital settings, with patient infection through exposure to contaminated aerosols generated by cooling towers, showers, faucets, respiratory therapy equipment, and room-air humidifiers.[70] Most of the patients were immunocompromised.[71] Legionnaires' disease has also been reported in long-term-care facilities.[72] The key to preventing Legionnaires' disease is maintenance of the water systems, as detailed in *ASHRAE Guideline 12-2000*: *Minimizing the Risk of Legionellosis Associated with Building Water Systems.*

INFECTION CONTROL

The CDPH,[73] CDC,[74] and the World Health Organization (WHO)[75] published guidelines to prevent the transmission of infectious agents in health care settings. As discussed below, administrative and environmental controls greatly reduce the potential for the transmission of airborne diseases. Administrative controls include the separation and masking of potentially infectious patients, and the implementation of droplet precautions and respiratory hygiene/cough etiquette. Environmental controls include ventilation, filtration, room pressurization differentials, temperature and humidity controls, and the proper maintenance of HVAC systems.

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67 CDC, *Guidelines for Environmental Infection Control,* 41.

68 Mayo Clinic, "Diseases and Conditions: Legionnaires' Disease," Mayoclinic.org, http://www.mayoclinic.org/diseases-conditions/legionnaires-disease/basics/symptoms/con-20028867.

69 Ibid.

70 CDC, *Guidelines for Environmental Infection Control,* 41.

71 Anjali Joseph, "The Impact of the Environment on Infections," 12.

72 Meena H. Seenivasan, Victor L. Yu, and Robert R. Muder, "Legionnaires' Disease in Long-Term Care Facilities: Overview and Proposed Solutions,". *Journal of the American Geriatric Society* 53, no. 5 (2005): 875–80.

73 CDPH, "Health Care Associated Infections and Infection Control Guidelines," modified 6/26/2014, http://www.cdph.ca.gov/pubsforms/Guidelines/Pages/HAIandIC.aspx.

74 CDC, *2007 Guidelines.*

75 World Health Organization (WHO), "Infection Prevention and Control of Epidemic- and Pandemic-Prone Acute Respiratory Diseases in Health Care: WHO Guidelines," World Health Organization, April 2014, http://www.who.int/csr/bioriskreduction/infection_control/publication/en/.

6. Environmental Analysis

Administrative Controls

Administrative controls, including early detection, isolation and reporting, and establishment of an infection control infrastructure, are key components for the containment and mitigation of airborne infectious diseases. Standard Precautions should be applied routinely to all patients in all health care settings, including hand hygiene, use of personal protection equipment (PPE) to avoid direct contact with patient fluids, prevention of needle stick/sharp injuries, and cleaning and disinfection of the environment and equipment.[76] To prevent the transmission of respiratory infections that can be transmitted via droplet or airborne pathways, the CDPH and the CDC state that the following infection control measures should be implemented at the first point of contact with a potentially infected patient:[77]

- **Visual alert** posted at the entrance to outpatient facilities instructing patients and people who accompany them to inform health care personnel of symptoms of a respiratory infection when they first register and to practice Respiratory Hygiene/Cough Etiquette.

- **Respiratory Hygiene/Cough Etiquette** include the following measures to contain respiratory secretions.

  - Cover your mouth and nose with a tissue when coughing or sneezing;
  - Use the nearest waste receptacle to dispose of the tissue after use;
  - Perform hand hygiene (hand washing with soap and water or alcohol-based hand rub) after contact with respiratory secretions and/or contaminated objects/materials.

- **Masking and Separation** is important for persons who are coughing and provide either procedure masks (with ear loops) or surgical masks (with ties) to contain respiratory secretions and encourage coughing patients to sit at least three feet away from others in common waiting areas.

- **Droplet Precautions** should be observed by all health care personnel (i.e., wearing a surgical or procedure mask for close contact), in addition to Standard Precautions, when examining a patient with symptoms of respiratory illness, particularly if a fever is present.

In addition to administrative controls, the CDPH in conjunction with the California Tuberculosis Controllers Association (CTCA) issued guidelines for infection control for patients with tuberculosis.[78] The Curry International Tuberculosis Center (referred to herein as Curry Center) also issued guidance for TB infection control in clinic settings.[79] They recognize that patients who are at high risk for TB often receive care at public health and community clinics prior to diagnosis and treatment, and recommend that all clinics have a TB infection control plan in place.

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76 Ibid., 43–48.

77 CDC, "Respiratory Hygiene/Cough Etiquette in Healthcare Settings," modified 2/27/2012, http://www.cdc.gov/flu/professionals/infectioncontrol/resphygiene.htm.

78 CDPH and California Tuberculosis Controllers Association, "Infection Control," CDPH CTCA Joint Guidelines: Categories, http://www.ctca.org/index.cfm?fuseaction=page&page_id=5075.

79 Curry International Tuberculosis Center, *Tuberculosis Infection Control: A Practical Manual for Preventing TB,* 2011.

The first step in plan implementation is to recognize that this risk is not equal in all facilities. The risk level will vary depending on the population served, type of building, procedures performed, community prevalence, and other factors. Some clinics perform high-risk procedures, such as sputum induction and bronchoscopy, while others do not.[80] Assessing the risk level of the facility will determine the level of TB control needed in terms of employee TB screening, environmental controls, and respiratory protection. Low-risk outpatient facilities are defined as having fewer than 3 TB patients per year, whereas medium risk outpatient facilities are defined as having 3 or more TB patients per year. The necessary precautionary measures and environmental controls are defined by the level of risk.[81]

Implementation of these administrative controls, in conjunction with environmental controls discussed in the following section, should minimize the potential for the transmission of chickenpox, measles, influenza, and TB in OSHPD 3 outpatient clinics. As noted above, three of these diseases (chickenpox, measles, and influenza) are preventable with vaccination.

Environmental Controls

Infectious Diseases

Environmental controls, or the use of engineering technologies, are also important in minimizing the spread of airborne infectious diseases. ASHRAE has developed a position document on airborne infectious diseases and states that airborne disease transmission can be reduced using dilution ventilation, directional ventilation, in-room airflow regimes, room pressure differentials, personalized ventilation, source capture ventilation, filtration, and ultraviolet germicidal irradiation (UVGI).[82] ASHRAE's position is that all health care facility designs should follow the latest practice guidelines, including FGI's *Guidelines for Design and Construction of Health Care Facilities* and *Standard 170-2013*. The CMC incorporates these ASHRAE standards and has more stringent requirements in some cases, such as the specification of more efficient filters. In addition, the Curry Center has recommendations for environmental controls to reduce the risk of spreading TB in clinic settings.[83]

Ventilation can reduce the risk of infection by dilution and removal.[84] When clean or fresh air enters the room, either by natural or mechanical ventilation, it dilutes the concentration of airborne particles and reduces the likelihood that a person in the room will breathe air containing infectious droplet nuclei. The removal effect occurs when potentially contaminated air is either exhausted outdoors or filtered to trap or inactive droplet nuclei.

Room pressure differentials are also important for controlling air flow between areas within the health care facilities. Negative pressure is created by exhausting more air from a room than is supplied to the room so that infectious particles are contained within the room. Negative pressure rooms at OSHPD 3 clinics include airborne infection isolation treatment/exam rooms, physical therapy areas, waiting rooms, and bathrooms.

80 Ibid., 51.

81 Ibid., 52.

82 ASHRAE, "Position Document," 14.

83 Curry Center, *TB Infection Control,* 66–70.

84 Ibid., 35.

6. Environmental Analysis

Positive pressure is created by supplying more air to a room than is exhausted and is used to prevent contaminated air from entering the room. Examples of positive pressure rooms at OSHPD 3 clinics include medication stations, clean linen rooms, and infusion rooms. Rooms that have no pressure requirements include corridors, administrative rooms, treatment and examination rooms, and occupational treatment rooms.[85]

Additional environmental controls include filtration and mandatory air exchange rates that vary depending on the room requirements. Filtration reduces the airborne load of infectious particles and can reduce the transport of infectious agents from one area to another when these areas share the same central ventilation system.[86] Table 4-B of the CMC identifies minimum filter requirements. For example, OSPHD 3 clinics require return air from treatment and examination rooms to be processed through a filter bank with two filters: a MERV 8 filter with 30% removal efficiency and a MERV 14 filter with 90% removal efficiency. For airborne infection isolation rooms, all air is exhausted directly to the outdoors after passing through a HEPA filter with 99.97% removal efficiency (MERV 17). The size range of TB droplet nuclei ranges from 1 to 5 μm.[87] Therefore, a MERV 14 filter would remove 90% or more of droplet nuclei in that size range.[88]

Air exchange rates for OSHPD 3 clinics are also dictated by Table 4-A of the CMC. Air exchange rates are units of ventilation that compare the amount of air moving through a space to the volume of the space. Air changes per hour (ACH) is the unit used in Table 4-A, which is the volume of air (in cubic feet) exhausted or supplied every hour divided by the room volume (in cubic feet). Different air exchange rates apply to different rooms in OSHPD 3 clinics depending on the potential for infection or contamination. Higher ACH is able to provide a higher dilution capability and consequently reduce the risk of airborne infections.[89]

Diseases from Environmental Sources

Environmental controls are also very important in controlling the outbreak or aspergillosis and Legionnaires' disease. Outbreaks of aspergillosis usually occur in hospital settings during renovation or construction activities that release fungal spores and affect immunocompromised patients.[90] Specific construction/demolition activities at hospitals that have resulted in outbreaks of aspergillosis were the result of dust released from false ceilings in a kidney transplant ward; spores released with the demolition of ducts, false ceiling, and the removal of fibrous insulation materials on a leukemia ward; spores in fibrous insulation above perforated metal ceiling impacting Intensive Care Unit (ICU) patients; and exposure to high

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85 Treatment and exam rooms are not defined in the CBSC. OSHPD generally defines an "exam room" as a room with bed or examination table in which procedures that do not require a specialized suite can be performed (e.g., pelvic examination). A "treatment" room is one in which interventional procedures (e.g., stitches) are performed but do not require a restricted (sterile) environment.

86 ASHRAE, "Position Document," 10.

87 Curry Center, *TB Infection Control,* 7.

88 ASHRAE, "Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size," Addendum b to ANSI/ASHRAE Standard 52.2-2007, 2008, 4.

89 WHO, *Natural Ventilation for Infection Control in Health-Care Settings*, ed. James Atkinson et al. (WHO Publication/Guidelines, 2009), 18.

90 National Disease Surveillance Centre [Ireland], *National Guidelines for the Prevention of Nosocomial Invasive Aspergillosis During Construction/Renovation Activities,* by the Scientific Advisory Committee Aspergillus Sub-committee, 2002, 6.

concentrations of spores following a filter change in the ICU.[91] In all of these cases, proper precautions during construction/renovation activities could have prevented the exposure to *Aspergillus* spores.

The key prevention measure is to develop a construction/renovation plan prior to the start of these activities that specifies procedures to 1) minimize the dust generated during construction and 2) prevent dust infiltration into adjacent patient care areas.[92] Other measures include the erection of airtight plastic and dry wall barriers around the construction sites, the use of negative-pressure ventilation in the construction areas, covering all air intake and exhaust vents in the construction zone to prevent the introduction of contaminated air into the HVAC system, and regular removal of construction debris from the site. Although no cases of aspergillosis have been found in the literature for ambulatory care settings, these precautions are appropriate for conducting construction or renovation activities at OSHPD 3 clinics. The APIC has also issued guidelines for infection control that should be followed during construction at health care facilities.[93]

The potential to contract Legionnaires' disease can be minimized through proper inspection and maintenance of the cooling towers and evaporative condensers associated with the HVAC system. The inhalation of aerosolized water containing *Legionella* bacteria can provide entry into the respiratory system. As noted above, ASHRAE's *Guideline 12-2000* provides details and operational guidelines for maintaining water systems to reduce the risk of Legionellosis.

The CDC has stated that "[d]uct cleaning in health-care facilities has benefits in terms of system performance, but its usefulness for infection control has not been conclusively determined."[94] The document further states that "[a]lthough infrequent cleaning of exhaust ducts in AII areas has been documented as a cause of diminishing negative pressure and a decrease in the air exchange rates, no data indicate that duct cleaning, beyond what is recommended for optimal performance, improves indoor air quality or reduces the risk of infection."[95] US Environmental Protection Agency (EPA) studies indicate that airborne particulate levels do not increase as a result of dirty air ducts, nor do they diminish after cleaning, presumably because much of the dirt inside air ducts adheres to duct surfaces and does not enter the conditioned space. The CDC concludes that "[a]dditional research is needed to determine if air-duct contamination can significantly increase the airborne infection risk in general areas of health-care facilities."[96] Although no mention was made about the cleaning of plenum spaces, it is reasonable to assume that the same results would apply to this situation. Also, as discussed previously, dust generation, whether it results from construction or renovation activities or duct/plenum cleaning, can result in the release of spores that can adversely impact immunocompromised patients. Therefore, great care should be taken if these activities are conducted in the health care setting.

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91 Ibid., 10–14.

92 Ibid., 20.

93 Judene Mueller Bartley et al., "APIC State-of-the-Art Report: The Role of Infection Control During Construction in Health Care Facilities," Association for Professionals in Infection Control and Epidemiology, Inc., *American Journal of Infection Control* 28, no. 2 (2000): 156–169.

94 CDC, *Guidelines for Environmental Infection Control*, 21.

95 Ibid., 21.

96 Ibid., 21.

6. Environmental Analysis

Impact Analysis

The methodology used in the impact analysis includes a literature review of plenum air compared to fully ducted systems and an assessment of risks based on disease characteristics, infection control procedures and other factors.

CHARACTERISTICS OF SPACES ALLOWING PLENUM RETURN AIR

The proposed CMC code change is applicable only to rooms within OSHPD 3 clinics that have no pressure requirements (denoted as "NR"). Table 4 lists the areas/rooms likely to be found in OSHPD 3 outpatient clinics to which the regulatory change would apply based on typical and prevalent spaces.[97] Table 4 also shows the minimum number of air changes and exhaust requirements. As part of the triennial update, certain changes to Table 4-A (see Appendix A).

Table 4 OSHPD 3 Areas Subject to Code Change and Air Exchange and Exhaust Requirements

A	B	C	D	E	F
			Conditioned Air not 100% O.S.A.		
Area Designation	Air Balance Relationship to Adjacent Areas	Minimum Air Changes if 100% O.S.A.	Minimum Air Changes of Outdoor Air Per Hour	Minimum Total Air Changes Per Hour	All Air Exhausted Directly to Outdoors
Patient holding preparation	NR	6	2	6	—
Dialysis treatment room	NR	6	2	6	—
Blood draw/phlebotomy	NR	6	2	6	—
Blood bank/tissue storage	NR	6	2	6	—
Administrative	NR	2	2	4	—
Patient area corridor	NR	2	2	4	—
Examination room Bloodborne infection isolation	NR	6	2	6	---
Radiology/Imaging: X-ray (Diagnostic and treatment), CT scan, MRI room, Ultra sound, Gamma camera	NR	6	2	6	---
Sub-sterile room	NR	10	2	10	Yes
Anesthesia storage	NR	8	---	8	Yes
Unsterile supply	NR	2	2	2	---
Pediatric Play Area	NR	6	2	6	---
Multipurpose room	NR	6	2	6	---
Occupational therapy	NR	6	2	6	---

Source: Table 4-A, CMC, CCR Title 24, Part 4, 2013.

As shown in Table 4, most of the rooms that involve the code change to allow plenum return air are not associated with procedures or patients that would transmit highly infectious diseases. Four of the rooms require direct exhaust to outdoor air: post-anesthesia care unit, anesthesia storage, substerile room, and

[97] Examples of rooms with no pressure requirement that are not likely to be found in OSHPD 3 outpatient clinics are food preparation areas and cafeterias, among others, and therefore they are not listed. See Appendix B for complete Table 4-A.

laundry room. As shown, in addition to support and administrative areas, exam and treatment rooms in OSHPD 3 outpatient clinics would be allowed to use plenum return air. Table 5 below identifies filter bank and efficiency requirements for areas in OSHPD 3 outpatient clinics affected by the proposed regulatory change. For treatment and exam rooms, or areas providing direct service care, the recirculation of return air is allowed but must pass through a filter bank with MERV 8 and MERV 14 filters. Rooms such as administrative offices or staff support areas only require return air to be circulated through one filter (MERV 8).

Table 5 Filter Efficiencies by Areas Subject to Code Change in OSHPD 3 Clinics

Area Designation	Minimum Number of Filter Banks	Filter Efficiency % Filter Bank (Minimum Efficiency Reporting Value [MERV])[1]		
		No. 1	No. 2	No. 3
Delivery rooms; patient care treatment, diagnostic, and related areas; areas providing direct patient service or clean supplies such as sterile and clean processes	2	30%	90%	---
		(8)	(14)	---
Administrative, med staff support areas, bulk storage, and laundries	1	30%	---	---
		(8)	---	---

Source: Table 5-A, CMC, CCR 24, Title 24, Part 4, 2013.

[1] HEPA filter location in the supply duct which serves the positive-pressure isolation room or rooms may serve more than one supply outlet and more than one positive-pressure isolation room. HEPA filter or a filter with minimum efficiency reporting value (MERV) of 17 installation shall be designed and equipped to permit safe removal, disposal, and replacement of filters.

As discussed in the Environmental Setting, areas with no pressure requirement do not require as stringent environmental controls as protective environment rooms or waiting areas, where air from the plenum space is either exhausted directly to the outdoors or goes through a series of filters before being recirculated through the fully ducted supply air system. Further, patient care areas require two filter banks. With respect to TB, the only disease of concern for which there is no vaccination widely used in the United States, a MERV 14 would remove 90% or more of droplet nuclei in that size range. Measles, chickenpox, and influenza also have droplet nuclei in the 1 to 5 μm range that would be removed by MERV 14 filters. It is also important to note that there are no requirements in the CMC for fully ducted return systems in patient serving areas of non-licensed clinics and doctor's offices.

PLENUM RETURN VS. DUCTED RETURN AIR: LITERATURE REVIEW

The important issue is whether the proposed code change, which would allow the use of plenum space for return air in non-pressurized rooms in OSHPD 3 clinics, would result in an increased risk of infectious disease transmission. A search of the literature did not reveal any studies that address this issue. The ASHRAE *Position Document on Airborne Infectious Diseases* does not discuss this issue. In discussing HVAC requirements for outpatient facilities, FGI's *2014 Guidelines for Design and Construction of Hospitals and Outpatient Facilities* bases the requirement for ducted return air on the use of space and incorporates by reference ASHRAE's *Standard 170-2014* for patient care areas. *Standard 170-213* bases requirements for ducted return air on the need for differential pressure control and does not require ducted return air for non-pressurized

rooms. In the minutes of the 2012 ASHRAE Standard 170 subcommittee, Chairman Paul Ninomura stated that there was a lack of scientific studies that show a relationship between infection issues and plenum returns, and based on feedback regarding the magnitude of cost for ductwork, increased fan size, possible need for return fans, and increased fan energy, he recommended that *Standard 170* be kept as it currently exists and only require ducted returns in rooms with differential pressure requirements.[98] He also stated that all of the air, whether ducted or plenum, would be treated at the air handling unit in the same manner. There is a reference to fully ducted versus plenum returns in the 2013 ASHRAE *HVAC Design Manual for Hospitals and Clinics*. This reference states:

> Most designers prefer fully ducted return systems in health care facilities, including outpatient clinics, because of their inherently superior sanitary characteristics. Some codes mandate fully ducted systems for all inpatient facilities. Ducted returns protect the airstream from direct exposure to such potential plenum conditions as accumulated dust, microbes or odors generated by wet materials; rodent droppings; fibers from deteriorated flame proofing or equipment; and smoke produced by smoldering wiring insulation or other sources during a fire. To minimize the latter possibility, NFPA codes require that electrical cables installed in plenums used for air movement must be of plenum-rated type. Above-ceiling plenums, in particular, are prone to disturbance by maintenance activities that could release opportunistic fungi or allergens into a return airstream.

However, this paragraph does not reference any studies or research to indicate that plenum return air is inherently more likely to transmit dust, microbes, odors, or infectious diseases than fully ducted systems. In fact, one outbreak of *Aspergillus* infection had been traced to contaminated insulation in the ducting of a hospital's HVAC system.[99] Another outbreak was due to an air filter change in the HVAC system of a hospital ICU unit, resulting in the release of high concentrations of airborne *Aspergillus* species.[100] ASHRAE's *HVAC Design Manual for Hospitals and Clinics* also states that ductwork collects deposits of dust and can become contaminated with microbial colonization. The reference adds that numerous studies also attribute nosocomial infections (i.e., hospital-acquired) to microbes growing in ductwork or air-handling equipment. Exposure to dust or microbes can be spread through the HVAC system regardless of whether it is a fully ducted system or a plenum space. The absence of scientific studies in the literature review conducted as part of this Initial Study, and as reflected in Chairman Ninomura's statements in developing the national standard for ventilation requirements for health care facilities, supports the reasonable inference that the use of plenum return air as compared to fully ducted systems presents no greater risks of infectious disease transmission.

Duct insulation, including fiberglass or other porous lining materials, has the ability to support heavy fungal contamination levels.[101] In addition, the microenvironment inside the duct, with high humidity contributes to

98 ASHRAE, "Meeting Minutes," Annual Meeting of the SSPC 170 Committee, San Antonio, TX, June 26, 2012, p. 4, no. 25.

99 B. D. Lutz et al., "Outbreak of Invasive Aspergillus Infection in Surgical Patients Associated with a Contaminated Air-Handling System," *Clinical Infectious Diseases* 37, no. 6 (September 15, 2003): 791.

100 NDSC, *National Guidelines,* 14.

101 Lisa M. Brosseau et al., "Methods and Criteria for Cleaning Contaminated Ducts and Air-Handling Equipment," *ASHRAE Transactions 2000* 106, part 1 (n.d.): 3.

fungal buildup.[102] Therefore, fully ducted systems are as likely to be a source of contamination as plenum spaces. In fact, plenum spaces may have lower humidity given the greater volume of air space. Accordingly, plenums may have less potential for contamination associated with fungal buildup.

As noted in the Environmental Setting discussion above, CDC has not concluded that duct cleaning reduces the risk of infectious disease transmission. Further, one ASHRAE article states that often it is best to leave most lined ductwork untouched, as duct cleaning creates more issues that it solves.[103] A similar recommendation would apply to the return air plenum space. Although return air plenums could have dust accumulation, return air ducts could have similar or even thicker layers of dust.[104] In both cases, the air will be filtered at the air handling unit before the recirculated air is supplied to the space, so it is generally not an indoor air quality issue. If these areas are not disturbed, there is limited potential for dust, microbes, or spores to be released. While viruses, bacteria, and fungi clearly can survive on environmental surfaces, including ducts, they only rarely cause disease when reintroduced into the air.[105] Therefore, plenum return air is concluded to have no higher likelihood of fungal buildup than ducted return air infection control and plenum return air.

INFECTION CONTROL AND PLENUM RETURN AIR

As discussed above, the proposed code change to allow plenum return air at OSHPD 3 clinics applies to a subset of non-pressurized rooms that are mainly used as administrative or support areas and are not likely to have significant exposure to infectious patients, with the exception of treatment rooms and examination rooms. In these rooms, both patients and health care providers would be following administrative controls to prevent the spread of infection, including masking, respiratory hygiene, and droplet precautions. Environmental controls also apply to these rooms. The exhaust air from these rooms would be recirculated through a bank of filters with 30% and then 90% removal efficiencies. As discussed above, MERV 14 filters remove 90% of TB droplet nuclei. These are the same precautions that are used for operating rooms (except for orthopedic operation, bone marrow, and organ transplant operating rooms, which would likely not occur at outpatient clinics) and airborne infection isolation rooms, so there would be no increased risk for airborne disease transmission.

Also, the types of diseases that would be seen in an OSHPD 3 clinic setting and have airborne transmission pathways are very limited. The transmission of measles, chickenpox, and influenza can be prevented through vaccination and the use of precautionary measures during examination and treatment. If the clinic is likely to see patients with TB, then a tuberculosis infection control program should be in place. Waiting rooms are under negative pressure and have a minimum air exchange rate of 10 ACH to minimize disease transmission, but these rooms are not part of the proposed code change.

Diseases such as aspergillosis have been reported in hospital settings, usually during construction or renovation activities that release dust and fungal spores. It primarily affects immunocompromised patients,

[102] Ibid., 1.

[103] Dan Int-Hout, "The Deal About Duct Lining," *ASHRAE Journal* (May 2014): 99.

[104] Steven T. Taylor, "Return Air Systems," *ASHRAE Journal* (March 2015): 45.

[105] Brosseau et al, "Methods and Criteria for Cleaning Contaminated Ducts," 2.

and cases have not been reported in clinic settings. However, it could occur during construction and renovation activities in clinic settings if immunocompromised patients are present. Precautions should be taken by preparing a construction/demolition plan to minimize the dust generated during construction and prevent dust infiltration into patient care areas if these activities will occur while patients are present. Legionnaires' disease could occur with improper maintenance of the cooling towers and evaporative condensers, but most cases are associated with immunocompromised patients in hospitals or long-term health care facilities.

SUMMARY

The relationship between HVAC systems and airborne pathogen transmission is largely unknown, but is the subject of ASHRAE future research.[106] *Standard 170-2013* requires ducted return air for rooms with differential pressure control, but does not require ducted return air for non-pressurized rooms. There are no studies or research cited in the national standards or guidelines or identified through independent literature review as part of this Initial Study, to indicate that plenum return air is inherently more likely to transmit dust, microbes, odors, or infectious diseases than fully ducted systems. In addition, the proposed code change affects a limited number of non-pressurized rooms where large numbers of infectious patients are not likely to be present. Treatment and exam rooms, to which the proposed change applies, would have only one or two persons at a time in the room other than health care workers, who are trained in administrative controls to prevent disease transmission. Waiting rooms typically have a large number of patients who would likely be present over long periods of time. The proposed change does not apply to these areas, which are subject to stringent environmental controls. Further, plenum return air is allowed in medical offices, surgery centers, and clinics not subject to OSHPD 3 licensing, lending further support to the conclusion that the proposed code change would not cause or substantially contribute to an increased risk of infectious disease transmission, and the impact would be **less than significant.**

6.4 BIOLOGICAL RESOURCES

Would the project:

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or US Fish and Wildlife Service?				**X**
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?				**X**

[106] ASHRAE, "ASHRAE Research Strategic Plan 2010–2015: Navigation for a Sustainable Future" n.d., 23.

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Have a substantial adverse effect on federally protected wetlands as defined by section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?				X
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?				X
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				X
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?				X

Comments:

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or US Fish and Wildlife Service?

No Impact. Special status species include: those listed as endangered or threatened under the federal Endangered Species Act or California Endangered Species Act; species otherwise given certain designations by the California Department of Fish and Wildlife; and plant species listed as rare by the California Native Plant Society. The project is a regulatory change related to plenum return air within the building envelope and therefore would not directly impact special status species. Further, the design of ventilation systems would not directly impact facility siting decisions because the project only provides for greater design flexibility within the building compared to conditions without the project. Accordingly, the project would not impact special status species or their habitats.

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or US Fish and Wildlife Service?

No Impact. Sensitive natural communities are natural communities that are considered rare in the region by regulatory agencies; that are known to provide habitat for sensitive animal or plant species; or are known to be important wildlife corridors. Riparian habitats occur along the banks of rivers and streams. The proposed project would not result in direct or indirect effects to these natural communities for the reasons discussed in Section 3.4(a) above. No impact would occur.

c) Have a substantial adverse effect on federally protected wetlands as defined by section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

No Impact. Wetlands are defined under the federal Clean Water Act as land that is flooded or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of vegetation adapted to life in saturated soils. The proposed project is the adoption of regulations and is not site specific. Thus, the project would not directly adversely affect protected wetlands. Further, the design of plenum return pursuant to the project would not dictate facility siting with respect to new construction as compared to conditions without the project. Thus, the project would not impact federally protected wetlands.

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

No Impact. The project is a regulatory change that provides more ventilation design flexibility in certain areas of OSHPD 3 clinics. The project would not impact wildlife movement or migration corridors or nursery sites. No impact would occur.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

No Impact. The project is not site specific since it involves proposed regulatory changes that would apply statewide. Construction pursuant to the changes would occur within the building envelope and would not impact biological resources policies or ordinances relative to existing code requirements.

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

No Impact. The project is not site specific and therefore would not conflict with an adopted habitat conservation plan or natural community conservation plan for the reasons explained in the sections above. No impact would occur.

6.5 CULTURAL RESOURCES

Would the project:

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5?				X
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?				X
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?				X
d) Disturb any human remains, including those interred outside of formal cemeteries?				X

Comments:

a) Cause a substantial adverse change in the significance of a historical resource as defined in

No Impact. Section 15064.5 defines historic resources as resources listed or determined to be eligible for listing by the State Historical Resources Commission, a local register of historical resources, or the lead agency. Generally, a resource is considered "historically significant" if it meets one of the following criteria:

i) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

ii) Is associated with the lives of persons important in our past;

iii) Embodies the distinctive characteristics of a type, period, region or method of construction, or represents the work of an important creative individual, or possesses high artistic values;

iv) Has yielded, or may be likely to yield, information important in prehistory or history.

The project is a proposed regulatory change related to plenum return for certain areas of OSHPD 3 outpatient clinics. The project is not site specific and therefore would not directly cause an adverse change in the significance of historical resources. Conversion of existing buildings to OSHPD 3 outpatient clinics could potentially involve historical buildings. To the extent that conversion of historic structures to OSHPD 3 clinics governed by these regulations occurs, it is anticipated that the proposed change would be beneficial relative to existing regulations. The use of plenum return air in ceilings would result in fewer alterations of building interiors in spaces where the provisions applies, compared to current requirements for fully ducted systems. Ductwork, except for the use of flexible ducting in spans up to ten feet, is in the form of rigid metal ducting. To install such ducting within existing buildings, some elements, such as structural members, may have to be altered (e.g., cut). The use of plenum return air in permissible space eliminates the need for return supply ductwork. No impact would occur.

b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?

No Impact. Archaeological resources are prehistoric or historic evidence of past human activities, including structural ruins and buried resources. The project involves a proposed change to the CMC, and no direct impacts to archaeological resources would occur as the project is not site-specific. Further, the choice of ventilation systems afforded by the project for certain areas of OSHPD 3 outpatient clinics would not cause an adverse change in archaeological resources since the changes would occur within the building envelope. Relative to existing regulations, the project would not cause any adverse change in archaeological resources.

c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

No Impact. Paleontological resources are fossils, that is, the recognizable remains or evidence of past life on earth, including bones, shells, leaves, tracks, burrows, and impressions. The project involves a statewide regulation change and is not site specific. Therefore, the project would not directly destroy paleontological resources or unique geographic features. With respect to indirect impacts, the project would afford additional options in terms of the design of ventilation systems within certain spaces of OSHPD 3 outpatient clinics. The changes occur within the building envelope, and therefore no indirect impacts are anticipated with project implementation compared to existing regulations.

d) Disturb any human remains, including those interred outside of formal cemeteries?

No Impact. The project involves regulation changes and is not site specific. The project would not disturb human remains, directly or indirectly, since project implementation only relates to ventilation design choices within the building envelope. No impact would occur.

6.6 GEOLOGY AND SOILS

Would the project:

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map, issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.				X
ii) Strong seismic ground shaking?				X
iii) Seismic-related ground failure, including liquefaction?				X
iv) Landslides?				X
b) Result in substantial soil erosion or the loss of topsoil?				X

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?				X
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?				X
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?				X

Comments:

a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning map, issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

No Impact. The project is a proposed statewide regulation change to the CMC. The project is not site specific and would not expose people to risks associated with known earthquake faults. Further, implementation of the project would only affect the choice of design and installation of plenum return air within certain rooms and spaces, all within the building envelope. The project would not impact siting of facilities, and therefore no indirect effects related to seismic risks would occur. Finally, site-specific projects would be subject to the California Buildings Code (CBC), which outlines requirements for geotechnical investigations, structural design, and testing of inspection during construction to address seismic-related risks. The project would not alter these existing requirements nor impact soil conditions or properties. No impact would occur.

ii) Strong seismic ground shaking?

No Impact. For the reasons discussed in Section 6.6(a)(i), the project would not result in direct or indirect effects related to strong seismic ground shaking. No impact would occur.

iii) Seismic-related ground failure, including liquefaction?

No Impact. Liquefaction refers to loose, saturated sand or silt deposits that behave as a liquid and lose their load-supporting capability when strongly shaken. Loose granular soils and silts that are saturated by relatively shallow groundwater are susceptible to liquefaction. For the reasons discussed in Section 6.6 (a)(i), no impact would occur.

iv) Landslides?

No Impact. The project is not site specific and involves proposed changes to the CMC. Design and installation of plenum return air within the building envelope, with project implementation, would not expose people or structures to landslide hazards. Further, the proposed change would not be determinative in terms of facility siting. No impact would occur.

b) Result in substantial soil erosion or the loss of topsoil?

No Impact. For the reasons discussed above, the project would not result in soil erosion. No impact would occur.

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

No Impact. The proposed project is adoption of statewide regulations and is not site specific. Unstable soil conditions that would trigger landslide, lateral spreading, subsidence, liquefaction, or collapse are dependent on soil properties associated with specific project sites. Implementation of the project would allow for additional choices in ventilation systems within certain rooms and spaces within the building envelope of OSHPD 3 outpatient clinics. The project would not affect where new facilities are sited. Site-specific projects would be required to adhere to the CBC, which addresses unstable soils through requirements for geotechnical investigations, structural design, and testing and inspections. No impact would occur.

d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?

No Impact. Expansive soils shrink or swell as the moisture content decreases or increases; this shrinking or swelling can shift, crack, or break structures. The project is not site specific and would not directly create risks due to expansive soils. Project implementation would provide additional design choices in certain rooms and spaces within plenum space. These choices would not affect the siting of facilities, and therefore would not indirectly impact risks related to location of facilities on expansive soils. Further, the project would not alter existing building code requirements related to geotechnical investigations, structural design, and testing and design to address expansive soils. No impact would occur.

e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

No Impact. The project does not involve work on wastewater disposal systems and would not affect the choice of wastewater disposal method for affected clinics. Finally, site-specific projects would be subject to the CBC, which outlines requirements for geotechnical investigations, structural design, and testing and inspection during construction to address soil suitability. No impact would occur.

6.7 GREENHOUSE GAS EMISSIONS

Would the project:

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?				X
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?				X

Comments:

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

No Impact. Global climate change is not confined to a particular project area and is generally accepted as the consequence of global industrialization over the last 200 years. A typical project, even a very large one, does not generate enough greenhouse gas emissions on its own to influence global climate change significantly; hence, the issue of global climate change is, by definition, a cumulative environmental impact.

The proposed regulatory changes would allow for plenum return air in certain spaces in lieu of rigid metal ducting. As discussed in Section 6.17(h), public comments received by OSHPD in response to the proposed 2013 changes to the CMC identified that allowing for plenum return air could result in more energy consumption as a result of additional thermal loads and more energy demands because of the heat transfer from exterior plenum walls and roofs. Increased energy consumption would have indirect impacts in terms of GHG. However, as discussed in that section, the weight of literature concludes that the use of plenum return air reduces energy consumption and is energy efficient. This would have a positive impact on GHG emissions compared to existing conditions. No adverse impact would occur.

b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

No Impact. The California Air Resources Board's (CARB) Scoping Plan is California's GHG reduction strategy to achieve the state's GHG emissions reduction target established by AB 32, which is 1990 levels by year 2020. Statewide strategies to reduce GHG emissions include the Low Carbon Fuel Standard, California Appliance Energy Efficiency regulations, California Renewable Energy Portfolio standard, changes in the corporate average fuel economy standards, and other measures. In addition, new buildings are required to comply with the California Energy Code and California Green Building Standards Code. The project would not directly affect applicable plans, policies, or regulations because it is not site specific. Cumulatively, OSHPD 3 outpatient clinics constructed pursuant to the changes would be required to comply with the aforementioned energy efficiency and green building requirements. Accordingly, the project would not have

the potential to indirectly interfere with the State's GHG reduction goals and strategies. No impact would occur.

6.8 HAZARDS AND HAZARDOUS MATERIALS

Would the project:

Issues		Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a)	Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?				X
b)	Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?				X
c)	Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?				X
d)	Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?				X
e)	For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?				X
f)	For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?				X
g)	Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?				X
h)	Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?				X
i)	Cause or substantially contribute to increased risk of fire spread?			X	

Comments:

a) Create a significant hazard to the public or the environment through the routine transport, use or disposal of hazardous materials?

No Impact. The project itself would not directly involve the transport, use, or disposal of hazardous materials and therefore would not directly create significant hazards to the public or the environment. Upon implementation, the project would allow for ventilation alternatives (i.e., plenum return air) in certain spaces

of OSHPD 3 clinics. Site-specific project construction and conversions would involve small amounts of hazardous materials (e.g., paints, solvents, and fuels). However, the types and quantities of hazardous materials would not differ substantially and may in fact decrease, depending on the extent to which space above the ceiling is used for return air in place of rigid metal ducting, which may involve use of hazardous materials during fabrication and installation. The project would not affect the application of existing federal, State, and local regulations, including the Hazardous Materials Transportation Act, the California Fire Code, and federal and State regulations enforced by the Occupational Safety and Health Administration and the Division of Occupational Safety and Health, respectively, regarding the transport, use, and disposal of hazardous materials. No impact would occur.

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

No Impact. For reasons discussed above, the project itself does not involve the use, transport, or disposal of hazardous materials, and therefore would not create a significant public hazard through upset or accident conditions. Project implementation would afford design alternatives for return air within certain areas of OSHPD 3 outpatient clinics. These changes would occur within the building envelope. The project would not affect any of the existing regulations requiring proper training of construction workers in containment and cleaning of such materials during a spill or release, or requirements regarding notification of appropriate emergency response agencies. No impact would occur.

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

No Impact. The project is not site specific, and no direct impacts on schools relative to hazardous emissions would occur. The project would not increase the risk of emissions or release of materials relative to nearby schools above what is already present because the project only allows return air alternatives that would occur within the building envelope. No impact would occur.

d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government code section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

No Impact. California Government Code section 65962.5 requires the compiling of lists of the following types of hazardous materials sites: hazardous waste facilities subject to corrective action; hazardous waste discharges for which the State Water Quality Control Board has issued certain types of orders; public drinking water wells containing detectable levels of organic contaminants; underground storage tanks with reported unauthorized releases; and solid waste disposal facilities from which hazardous waste has migrated. The project is not site specific and therefore would not directly affect the location of facilities on a hazardous materials site. With respect to indirect effects, site-specific projects that seek to locate on listed properties would be subject to a myriad of State and federal regulations for environmental assessment and remediation. The project would not affect any of these regulations. Accordingly, there is no impact.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles or a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?

No Impact. Land uses can create airport-related hazards for occupants if they result in substantial concentrations of people in areas subject to aviation crash hazards or if they intrude into airspace regulated by the Federal Aviation Administration (FAA) to prevent obstructions to air navigation. The project involves a regulatory change and is not site specific. Accordingly, it would not directly result in a safety hazard. Site-specific projects may be located within an airport land use plan or in proximity to airports, but the project would not affect any of the existing requirements related to consistency with airport land use plan safety zones and FAA regulations protecting navigable airspace. Further, any work pursuant to the project would occur within a building envelope, and the plenum space specifically, and would not be impact building height. Accordingly, no impact would occur, and no further analysis is warranted.

f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?

No Impact. For the reasons discussed above in Section 6.8(e), no impact would occur.

g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

No Impact. California counties prepare and maintain emergency operations plans in compliance with state and federal requirements. The proposed project would not directly affect emergency response or evacuation plans. Upon project implementation, the design and installation of plenum return air would occur within the plenum space, inside the building envelope. It would not block emergency access routes to communities surrounding affected project sites nor otherwise interfere with implementation of emergency operation plans. No impact would occur.

h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

No Impact. The project is a regulatory change and would not directly expose people or structures to risks involving wildland fires. Site-specific clinics may be adjacent to wildland vegetation and fire hazard severity zones mapped by the California Department of Forestry and Fire Prevention The project would not affect siting decisions—it only affords additional options for plenum return air design and installation in certain spaces. Therefore, the project would not increase the number of people or structures exposed to risk of wildland fires. Further, the project would not affect existing requirements in Chapter 7 of the CBC related to design and construction of buildings in a Wildland Urban Interface Fire Area. No impact would occur.

i) Cause or substantially contribute to increased risk of fire spread?

Public comments received by OSHPD regarding changes proposed to the 2013 CMC stated that the allowance for plenum return air could result in increased fire risk within clinics. The assertion was that

unducted systems would result in a larger supply of oxygenated air in a plenum environment. Combined with flammable materials associated with cables in plenums versus ducts, these factors could increase the risk of spread of fire and smoke. These identified concerns are discussed below. The Regulatory Setting describes applicable national standards and State codes. A description of fire risks in health care facilities, with information on risks related to plenum and cabling, is in the Environmental Setting section, below. This section concludes with an Impact Analysis that assesses the proposed code change on risk of spread of fire and smoke.

Regulatory Setting

FEDERAL PLANS, POLICIES, REGULATIONS AND LAWS

There are no federal plans, policies, regulations, or laws that address fire requirements relative to the project. National standards developed by the National Fire Protection Association (NFPA) are incorporated into the International Fire Code (IFC) developed by the International Code Council and adopted by reference in the California Fire Code (CFC). A discussion of NFPA standards related to HVAC systems and materials within plenum spaces follows. References to CBSC codes (e.g., CBC, CEC, CFC, and CMC) are also provided immediately following the description to avoid duplicating language of parallel State requirements in the description of relevant State Plans, Policies, Regulations, and Laws.

NFPA 90A – Standard for the Installation of Air-Conditioning and Ventilating Systems

This standard dates to 1899 has been updated several times, with the latest edition published in 2015.[107] The standard covers construction, installation, operation, and maintenance of air conditioning and ventilation to protect life and property from fire, smoke, and gases. The purpose of this standard is to:

- Restrict the spread of smoke through air duct systems within a building or into a building from outside
- Restrict the spread of fire through air duct systems from the area of fire origin
- Maintain the fire-resistive integrity of building components and elements such as floors, partitions, roofs, wall, and floor-ceiling or roof-ceiling assemblies affected by the installation of air duct systems
- Minimize ignition sources and combustibility of the elements in the air duct systems
- Permit the air duct systems in a building to be used for the additional purpose of emergency smoke control

Prior to 1964, the document required that "ducts shall be constructed entirely of noncombustible material such as iron, steel, aluminum or other approved material."[108] In 1964, changes were made to allow the use of

[107] National Fire Protection Association (NFPA), *NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems* (National Fire Protection Association, 2015).

[108] NFPA, *NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems Handbook* (National Fire Protection Association, 2015), "Origin and Development" (np).

attics, basements, or concealed spaces, called plenums, to be used to move environmental air. There were still some concerns for fire and life safety, so when plenums were allowed, the floor and ceiling construction had to have fire-resisting ceilings of not less than a 1-hour fire resistance rating. This changed in 1981 when the committee required smoke detectors to be used to shut down air-handling units when the aggregate cubic feet per minute of units connected to a common duct exceeded 2,000 cubic feet per minute (cfm).[109] Today, plenum space provides cost-saving construction applications by allowing environmental air to be moved through them, subject to requirements below.

Section 4.3.3 Supplementary Materials for Air Distribution Systems

4.3.3.1. Pipe and duct insulation and coverings, duct linings, vapor retarder facings, adhesives, fasteners, tapes, and supplementary materials added to air ducts, plenums, panels, and duct silences shall have a maximum flame spread index of 25 without evidence of continued progressive combustion and a maximum smoke developed index of 50 when tested in accordance with ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or with ANSI/UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*. This requirement is incorporated in CMC as section 604.0, Insulation of Ducts.

4.3.11 Plenums

This section contains specific requirements for plenums.

4.3.11.1 Storage

- Plenums shall not be used for storage or occupancy (4.3.11.1.1). CFC 315.3.4, General Storage, requires storage in attics[110] and concealed spaces[111] to be 1-hour fire-resistance-rated construction, unless the area is protected by an approved automatic sprinkler system or the building is used for certain occupancies.

- Abandoned cable (i.e., unused and out-of-date cable) is deemed in storage and shall be removed (4.3.11.1.2). The CEC defines abandoned cables as cable that is not terminated (at a connector and/or other equipment) and not identified for future use with a tag, and removal is required. Requirements for removal by cable type are in sections 725.25, 770.25, 760.25 and 800.25.

4.3.11.2 Ceiling Cavity Plenum.

Ceiling cavity plenums can be used to return air from occupied areas as long as:

- The integrity of the fire and smoke stopping for penetrations is maintained (4.3.11.2.1). CFC addresses penetrations and protections of ducts and air transfer openings in sections 714 and 717, respectively.

- Temperature of air delivered to these plenums does not exceed 121°C (250°F) (4.3.11.2.3). CMC 603.3, Factory Made Ducts, states that the temperature of the air to be conveyed in a duct shall not exceed 250°F.

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109 This requirement is incorporated into the CBSC. See CMC, ch. 6, § 608.1.

110 Attics are defined as the space between ceiling beams of the top story and roof rafters (see CFC § 202).

111 Concealed spaces refers to the portion of building behind wall, over suspended ceilings, attics that may contain combustible materials such as structural members, ducting or both. These spaces sometimes used as plenum chambers (see CMC § 205).

- Materials used in the construction of a ceiling plenum, other than fire-resistive assemblies, shall be noncombustible or limited combustible having a maximum smoke developed index of 50, except as permitted below (4.3.11.2.4):
  - The ceiling material shall have a flame spread index of not more than 25 and a smoke developed index not greater than 50 (4.3.11.2.5). The ceiling materials shall be supported by non-combustible material (4.3.11.2.4.3). A non-combustible material is defined as a material that will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat. CMC 602.2, Combustibles within Ducts or Plenums, contains these requirements.

- Materials located within a ceiling cavity plenum exposed to airflow shall 1) be noncombustible or 2) exhibit a maximum flame spread index of 25 and a maximum smoke developed index of 50 and shall comply with the following (4.3.11.2.6): CMC 602.2 contains these requirements.
  - Electrical wires, cable, and optical fiber cables must has a maximum flame spread distance of 1.5 m (5 feet) or less when tested in accordance with NFPA 262, *Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.* (See below.) Pneumatic tubing for control systems, nonmetallic fire sprinkler piping, and signaling, fiber optics, and communication raceways have the same requirements as electrical wires and cables, although the test procedures to determine the maximum flame spread are different. In addition, cables installed within raceways must be listed as plenum cable (4.3.11.2.6.1). See CMC 602.2.5.

  - Nonmetallic fire sprinkler piping shall be listed as having a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flamespread distance of 1.5 m (5 ft) or less when tested in accordance with ANSI/UL 1887, *Standard for Safety Fire Test of Plastic Sprinkler Pipe for Visible Flame and Smoke Characteristics*. CMC 602.2.7 contains this requirement.

  - Plastic piping and tubing used in plumbing systems are permitted for use within a ceiling cavity plenum if it exhibits a flame spread index of 25 or less and a smoke developed index of 50 or less when tested in accordance with ASTM E84 or ANSI/UL 723 (4.3.11.2.6.6). CMC 602.2.7 contains this requirement.

NFPA 99-12 Health Care Facilities Code

NFPA 99 establishes criteria for levels of health care services or systems based on risk to the patients, staff, or visitors in health care facilities to minimize the hazards of fire, explosion, and electricity. The CFC includes NFPA 99-12 as a referenced standard, and the codes and standards are considered part of CFC requirements. Other parts of the CBSC also identify NFPA 99 as a referenced standard: for example, the CPC.

UL 190/NFPA 262 Standard for Test Method for Fire and Smoke Characteristics of Cable Used in Air-Handling Spaces

Also known as the plenum test, this test method was developed to classify cables to meet the National Electrical Code (NEC) requirements. The NEC requires exposed cables not in conduit in plenums to be listed as "having adequate fire-resistant and low-smoke producing characteristics." When the NFPA Standard

was originally drafted, it was slightly different than the UL 190 standard. These differences were redrafted to be identical in 1998.

The test is performed in a 25-foot Steiner Tunnel test furnace. A single layer of 24-foot lengths of cable is supported by a one-foot-wide cable rack. The cables are ignited by a 300,000 BTU/hour methane flame, and flame spread is aided by a 240 feet/minute draft. During the 20-minute test, flame spread is observed through small windows spaced one foot apart. Smoke is measured by a photocell installed in the exhaust duct.

To qualify as a plenum rated cable (CMP), the cables must have a flame spread of less than 5 feet beyond the end of the 4.5-foot ignition flame, a peak optical density of 0.5 maximum, and a maximum average optical density of 0.15. Non-plenum-rated cable is referred to as CMX.

STATE PLANS, POLICIES, REGULATIONS, AND LAWS

The body of codes designed to provide life and structural safety is contained in various parts of the CBSC. As discussed, CSBC provisions that incorporate NFPA standards are identified above. A summary of other requirements related most directly to the project proposal in terms of use and occupancy and plenum spaces is provided below.

California Building Code (CBC) (CCR, Title 24, Part 2, Volume 1)

The CBC contains general building design and construction requirements relating to fire and life safety, structural safety, and access compliance. CBC provisions provide minimum standards by regulating and controlling the design, construction, quality of materials, use and occupancy, location, and maintenance of all buildings and structures and certain equipment.

Chapter 3 - Use and Occupancy Classifications

OSHPD 3 facilities are classified as either Business Group B or Institutional Group I, I-2.1. Section 304.1 defines Business Group B generally as places where services are provided and includes ambulatory care facilities serving five or more patients[112] and outpatient clinics.[113] Group I-2.1 is a subset of Institutional Group I, which designates places where people are unable to leave without assistance (e.g., hospitals and assisted living and correctional facilities). Group I-2.1 refers to ambulatory health care facilities that accommodate six or more patients that meet this definition.

Chapter 4 -- Special Detailed Requirements on Use and Occupancy

Section 422 Ambulatory Care Facilities

This section requires automatic sprinkler and fire alarm systems for ambulatory care facilities (422.6-7). Smoke compartments are also required where facilities exceed 10,000 sq. ft. on one floor. Further, facilities

[112] Section 202 defines "ambulatory care facility" as buildings or portions used for medical, surgical, psychiatric, nursing or similar on less than 24-hour basis to individuals incapable of self-preservation by services provided.

[113] "Clinic, outpatient" refers to buildings or portions used for medical, surgical, psychiatric, nursing or similar on less than 24-hour basis to individuals incapable of self-preservation by services provided (§ 202).

where there is potential for four or more care recipients to be incapable of self-preservation shall be separated from adjacent spaces by fire partitions.

Chapter 7 – Fire and Smoke Protection Features

710.8 Ducts and air transfer openings.

Space around ducts penetrating smoke partitions must be filled with approved material to limit passage of smoke. Air dampers required for I occupancies.

Office of State Fire Marshal (SFM)

The SFM is responsible for developing building standards for fire and panic safety, based on standards in the International Fire Code and NFPA. The SFM also gathers statistical information on all fires, medical aid incidents, and hazardous material incidents in California.

California Fire Code (CFC) (CCR, Title 24, Part 9)

The CFC establishes emergency access, means of egress, construction materials and methods, automatic sprinkler systems, fire alarm systems, and hazardous materials. Below are main code requirements pertaining to the project.

Chapter 9 – Fire Protection Systems

Section 903 Automatic Sprinkler Systems

Automatic sprinklers are required in Group I facilities. (903.2.6). This requirement also applies to surgical clinics, chronic dialysis clinics, and birthing clinics serving six or more patients.

903.2.2 Ambulatory care facilities.

Automatic sprinklers are required where four or more care recipients incapable of self-preservation or one or more patients are located on a level other than the level of exit discharge.

907 Fire Alarm and Detection Systems

An automatic smoke detection system is required within ambulatory care facilities and public use areas outside of tenant spaces (907.2.2.1). A manual and automatic fire alarm system is also required in I-2.1 occupancies (907.2.6.2).

Chapter 10 - Means of Egress

Section 1018 Corridors

1018.5.1 Corridor Ceiling.

The space between corridor ceiling and floor or roof may be used as return air plenum, provided the corridor is not required to be of fire-resistance-rated construction; there is separation from plenum by fire-rated-construction; the air-handling system serving the corridor is shut down by air-handling unit smoke detectors and sprinkler where automatic sprinklers are required; and the space is used as component of approved engineered smoke control system.

6. Environmental Analysis

California Mechanical Code (CMC) (CCR, Title 24, Part 4)

As cited above, the CMC establishes requirements pertaining to plenum space and fire hazard. The central requirement is contained in 602.2, Combustibles within Ducts or Plenums, which mirrors the requirements of NFPA 90A pertaining to exposed materials within plenums. Other requirements are:

Chapter 6 – Duct Systems

Section 608 Automatic Shutoffs.

608.1 General

Air-moving systems supplying air in excess of 2000 cfm to enclosed spaces must have automatic shut-off upon detection of smoke in the main supply-air duct served by the system.

California Electric Code (CEC) (CCR, Title 24, Part 3)

The CEC contains specific code requirements for different cabling that may be contained within the plenum. These requirements as pertaining to the project are cross-referenced in CMC section 602.2. The other main relevant requirement relates to abandonment of cable in plenum spaces (see above NFPA 90A discussion for code references).

Local Building Codes

The CFC does not mandate automatic sprinklers in several occupancy groups. Cities and counties adopt the CBSC, subject to local exceptions, and municipalities across the state have adopted into their municipal code requirements for automatic fire sprinkler requirements for Group B occupancies, among other groups. These requirements are applicable to new construction and, in some cases, existing conversions. OSHPD 3 facilities located in these jurisdictions would be required to install fire sprinklers, if not otherwise required, for example by CFC 903.2.2.

Environmental Setting

In a plenum air system, conditioned and ventilation air is distributed to and/or returned from the building spaces through a plenum. A plenum is an air compartment or chamber within the building, such as uninhabited areas above a drop ceiling or below a raised floor, which forms part of the air supply, return, or exhaust system. Under the current CMC, return plenums are prohibited in all OSHPD facilities. This section describes: 1) statistics related to the types and causes of fires that have occurred in health care facilities and the fire risk in plenum spaces; 2) the history and evolution of standards pertaining to combustible materials in plenum spaces; and 3) the potential toxicity of smoke generated during the burning of electrical and plastic coating materials within plenum spaces.

NFPA STATISTICS: FIRES IN HEALTH CARE FACILITIES

The NFPA compiled statistics on fires in health care facilities properties for the five-year period between 2006 and 2010.[114] These were fires reported throughout the United States. Statistics for individual states were not available. The following discussion summarizes the findings related to cause and frequency of fire, associated losses, and fire spread.

During the five-year reporting period, there were 6,240 fires at health care properties, which accounts for only 1.2% of the 506,400 reported structure fires.[115] Almost half of all reported fires were in nursing homes (46%), and only 11% occurred in clinics or doctor's offices. Cooking was the leading cause of fires in all health care properties. Sprinklers were present in 55% of the reported health care fires, and reported damage per fire was 61% lower than in properties with no automatic sprinkler system.

Fires in Clinics or Doctor's Offices

There was an average of 690 fires per year in clinics or doctor's offices. No deaths were reported for these facilities during the 5-year time period. There was an average of 6 reported injuries per year.

The predominant cause of fires was cooking equipment (35%), followed by heating equipment (10%), and electrical distribution or lighting equipment in another 10%. Eight percent of the fires were intentionally set, smoking materials started 6%, and medical equipment was involved in 4%. An electrical failure or malfunction was involved in 23% of these fires, abandoned or discarded materials or products in 15%, unattended equipment in 12%, and a mechanical failure or malfunction in 11% of the incidents.

Approximately 23% of the clinic or doctor's office fires started in a kitchen or cooking area, 11% began in an office, and 5% started in a lavatory, locker room, or check room. Cooking materials, including food, were first ignited in 22% of these fires, 12% started with electrical wire or cable insulation, and rubbish trash or waste was first ignited in 6%. Most of these fires were confined (69%) and did not spread beyond the object or container of origin. However, 16% of the fires spread beyond the room of origin. Only 2% of all fires in clinics or doctor's offices occurred in a duct for HVAC, cable, exhaust, heating, or air conditioning, and only 2% of all fires occurred in a ceiling/roof assembly or concealed space. In addition, NFPA data indicate that 85% of fires that involved HVAC systems did not spread beyond the room of origin.[116] Therefore, the likelihood of a fire occurring in a plenum space is very low.

[114] Marty Ahrens, "Fires in Health Care Facilities," NFPA Fire Analysis and Research Division, November 2012, rev. April 2013.

[115] Ibid., 1. "Health care facilities" include four categories of occupancies: hospitals or hospices; licensed nursing homes providing 24-hour care; mental health facilities providing care to individuals; and clinics, ambulatory care facilities, doctors' or dentists' offices or free-standing dialysis units.

[116] Building Research Establishment, "Examination of the Fire Resistance Requirements for Ducts and Dampers," ODPM Building Regulations Division [UK], 2005, 25.

6. Environmental Analysis

The California Office of the State Fire Marshal also keeps statistics on structure fires classified by property use.[117] Health care facilities are grouped with detention and correction facilities. There were a total of 79 incidents in 2013, resulting in 2 injuries and no deaths.

NFPA Statistics: Fires in Plenums

In 2001, a study evaluated NFPA fire statistics from 1980 to 1998 to determine if wire and cable in concealed spaces (i.e., plenums) have caused an increase in fire hazard.[118] The code change allowing the use of cables in plenum spaces without being encased in metal conduits or raceways, as long as they were fire resistant and low smoke producing, occurred circa 1980. The study looked at nonresidential structure fires in which ignition occurred in roof or floor plenums, and also whether wire or cable insulation was the item first ignited. The NFPA statistics showed that the fraction of all structure fires associated with roof or floor concealed spaces was very low (0.3% and 0.1%, respectively). Of the structure fires associated with concealed spaces, approximately 29% of the ceiling plenum fires involved electrical wire or cable insulation that was first ignited. This number was approximately 33% of the floor plenum fires.

Although the amount of plenum cable installed during the time period between 1980 and 1998 showed an exponential increase, the number of concealed space fires involving fixed wiring, and with wire and cable as the item first ignited, has been steadily decreasing. The NFPA fire statistics show the incidence of fires involving plenum cables is very low and has been decreasing over time, thus evidencing that plenum cables do not contribute to an increased fire risk.

EVOLUTION OF PLENUM FIRE PROTECTION STANDARDS

A plenum is the enclosed portion of a building structure, other than an occupied space, that is designed to allow air movement and thereby serve as part of the air distribution system. Supply, return, exhaust, relief, and ventilation air plenums are typically uninhabitable areas above a ceiling or below a floor. Items that can be found within plenums include:

- Plumbing: water supply lines, drain/waste pipe, fire sprinkler pipes, and pneumatic tubing
- Electrical: power cables, fiber optic cables, communication and AV cables.

Because of the concealed nature of the plenum space and the chemical composition of many items within the plenum, there can be fire and life safety challenges that are addressed through code requirements for items within environmental air handling spaces. The codes specify the fire test standards to be used to evaluate performance to a set of criteria. Fire protection requirements for materials located in plenums can be found in the building codes cited in the *Regulatory Setting* section above, including mechanical, plumbing, electrical, and fire applications.

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117 Office of State Fire Marshal, "Structure Fires by Property Use: 2013," California Department of Forestry and Fire Protection, 5/8/2014, http://osfm.fire.ca.gov/cairs/pdf/2013/structurefiresbypropertyuse-2013.pdf.

118 Marcelo M. Hirschler, "Statistics of Fires Involving Wire and Cable in Concealed Spaces and the Associated Fire Hazard and Fire Risk," proceedings of Fire Retardant Trends and Advances, Fall Fire Retardant Chemicals Association Technical Meeting, Lancaster, PA, October 2001, 1–19.

This discussion focuses primarily on the presence of electric cables within the plenum space and their implication with regard to fire risk. Although plumbing and drain lines can be present within a plenum space, this is not a common occurrence. Water lines and drain-waste-vent (DWV) systems are usually located within cavity walls (i.e., the partition space between walls). That said, potential fire risk of plastic pipe in plenum spaces associated with concurrent proposed California Plumbing Code changes is addressed at the end of this section under *Cumulative Impact Analysis.*

Plenum-Rated Cable (CMP)

The cable most often used in commercial buildings is called plenum cabling, and it is designed for use specifically in hidden spaces within dropped ceilings that handle return airflow to HVAC equipment. From the 1970s to the 1990s, several significant fires occurred where cable located within plenum spaces greatly increased the severity of fire damage, including the 1975 fire at the World Trade Center.[119] While an individual cable is extremely difficult to ignite, a group of cables lying together and parallel can burn intensely. From these fires, valuable lessons were learned. The ignition source is often electrical failure. However, cables can add significantly to the fuel load and spread the fire along the cable pathways and spaces.

As a result, in 1980 Underwriters Laboratories, Bell Laboratories, and DuPont developed an accepted test method to qualify cables for plenum service without metal protection. The result was UL 910, *Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces,* and the first plenum-rated cables.[120] The NFPA recognized that the UL 910 test was appropriate and incorporated it into the 90A standard. The equivalent and identical NFPA standard is NFPA 262. The test has two parts evaluating both cable burn properties and smoke density. The test requires cables to be burned for 20 minutes and should not have flame spread exceeding 1.5 meters (less than 5 feet), a peak optical density of 0.5, and a maximum average optical density of 0.15.

The validity of the UL 910/NFPA 262 protocol was demonstrated in a research program at British Research Engineering in the UK.[121] Tests were performed using the UL 910/NFPA 262 protocol and also in a full room fire test. The results indicated that the UL 910/NFPA 262 test results were comparable to the full-scale (full-room) test results, and the fire performance of the exposed CMP was comparable to CMX cable in metal trucking in the full-scale and UL 910/NFPA tests.

Analyses showed that for 9 years starting in 1988 and ending in 1996, the percentage of cables failing the UL 910/NFPA test increased from 10% to over 50%.[122] UL responded to this failure problem by forming an industry advisory panel referred to as TAPCOM (Technical Advisory Panel for Communications Cable) that made the following changes:

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119 Gary Stanitis and Fred Dohmann, "The Evolution of Plenum Cable Fire Standards and the Impact of those Standards on Material Specification," Wireville.com, http://wireville.com/news/news01.html.

120 Ibid.

121 Ibid.

122 Ibid.

- The UL 910 test apparatus (Steiner Tunnel, see section 6.8.1, Regulatory Setting, UL 190/ NFPA 262) above had a small leak due to corrosion in the exhaust duct that reduced the smoke developed value. This leak has been corrected, and the test performance has returned to the more severe screening criteria.

- UL hired a statistical process control consultant to establish and maintain reproducibility of the test.

- Some cables jacketed with polyvinyl chloride (PVC) compounds produced more variable smoke results depending on humidity. As a result, conditioning requirements have now been specified for cables prior to testing.

- Cables made with PVC and polyolefin (PO) compounds may pass the UL 910/NFPA 262 tests but are typically closer to the failure point than fluorinated ethylene propylene (FEP) cables. Therefore, UL will introduce a more severe test procedure for cables that perform marginally in smoke and flame.

Items that meet the performance criteria are referred to as "plenum-rated" and are labeled UL with a suffix of "P" such as MPP, CMP, CL2P, CL3P, and FPLP to designate approval of use in a plenum environment. Some of the plenum cables are insulated and jacketed with various fluoropolymers. Others contain highly flame-retarded and smoke-suppressed additives to PVC or PO materials. In summary, plenum cables must pass the most severe cable fire test: UL901/NFPA 262.

The NFPA realized that frequent changes in communications networks within commercial buildings resulted in large amounts of bypassed, unused cables lying within the plenums that could contribute fire load in the event of a fire. Now called "abandoned cables," unused plenum cables must be removed from air spaces, per NFPA 90A. This requirement is incorporated into the CEC, as discussed in the *Regulatory Setting* discussion above.

SMOKE TOXICITY AND FIRE HAZARD

Smoke toxicity during fires resulting from the thermal decomposition of PVC electrical insulation materials was also asserted by comments to be a fire hazard associated with the proposed allowance of plenum return air. As discussed above, plenum cable is typically enclosed within a fire retardant plastic jacket made of either low-smoke PVC or FEP. The concern is that halogen gases released during combustion would be toxic and pose an increased risk to building occupants and firefighters. The following discussion summarizes studies on these materials in fire and plenum fire settings.

PVC and FEP

Smoke toxicity has been an important factor in fire hazard assessments for more than 20 years. Approximately 67% of all fatalities of US fires occur in "flashover" fires, where the fire has progressed beyond the room of origin.[123] In such fires, the carbon monoxide concentrations are sufficient (and independent of the material burning) to cause lethal atmospheres. Therefore, in the majority of fires, and

[123] Marcelo M. Hirschler, "Fire Testing of Electric Cables for Public Transportation," presented at the Third Triennial International Fire & Cabin Safety Research Conference, Federal Aviation Administration, Atlantic City, NJ, October 2001, 12.

particularly in large fires, the smoke toxicity of individual materials or products has little effect on the overall toxic hazard.[124]

The National Institute of Standards and Technology developed a smoke toxicity test that involves the exposure of 6 rats to smoke for 30 minutes followed by a 14-day post-exposure period.[125] The number of fatalities is counted and toxic potency calculated as LC_{50}, which is the lethal concentration killing 50% of the animals. For post-flashover fires, values of LC_{50} greater than 8 mg/l are considered to be "normal toxicity," because this level corresponds to the toxicity of carbon monoxide at flashover. Thus, materials and products with $LC_{50} > 8$ mg/l would not contribute to the toxicity of the atmosphere itself.

PVC cable insulation, PVC traditional wire insulation, and PVC wire jacketing compounds with various acid retention fillers were tested, and the LC_{50} values ranged from 15 mg/l to 29 mg/l.[126] These results are within the range of commonly used construction materials. By comparison, Douglas fir was listed as having a LC_{50} value of 21 to 23 mg/l. Additional testing on a large variety of electrical materials and products by the National Electrical Manufacturers Association (NEMA), using the University of Pittsburgh toxicity test, showed virtually no difference in toxic potencies between polyolefins, fluoropolymers, and PVC compounds.[127] Accordingly, FEP, an alternative to PVC jacketing in plenum-rated cables, has smoke toxicity within ranges of commonly used construction materials. (See also *Halogen Acids* discussion below.)

Another fire hazard assessment study looked at two scenarios: 1) PVC wire coating installed in a plenum, with a fire starting in the room below, and 2) PVC wire coating installed in a plenum, with a fire starting in the plenum.[128] It was found that the amount of energy needed for the room fire to cause thermal decomposition of the PVC products in the plenum was larger than that needed to create a flashover fire. Thus, the PVC products did not add any significant fire hazard to that caused by the room fire. Similarly, with a fire started in the plenum, the temperature did not reach a sufficient level to decompose all of the PVC wire coating. If the plenum was vented to the surroundings, almost no smoke entered the room. If unvented plenum smoke entered the room, the fire burned for only a short period of time, and the level of oxygen was not enough for full combustion. In an extreme case where the fire generated sufficient heat, the fire itself would cause an untenable atmosphere in the room due to flashover long before the toxicity of the smoke from PVC products became a concern. It was concluded that PVC products behind fire-rated ceilings or in plenum spaces did not cause an increased fire risk to occupants.[129]

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124 Ibid., 12.

125 Ibid., 12.

126 The Vinyl Institute, "Fire and Polyvinyl Chloride," Technical committee publication (Morristown, NJ: The Vinyl Institute, 1996), 12.

127 Hirschler, "Fire Testing of Electric Cables," 12.

128 F. Merrill Galloway and Marcelo M. Hirschler, "Fire Hazard in a Room Due to a Fire Starting in a Plenum: Effect of Poly(vinyl chloride) Wire Coating," in *Fire and Polymers V: Materials and Concepts for Fire Retardancy*, ed. Charles A. Wilkie, Alexander B. Morgan, and Gordon L. Nelson, ACS Symposium Series, vol. 425 (Washington, DC: American Chemical Society, 2009), 592–611.

129 Ibid., 609.

6. Environmental Analysis

Halogen Acids

Previous commenters also raised the issue of hydrogen chloride (HCl) gas being released with the thermal decomposition of PVC products. When HCl is generated, it gives off a very pungent odor, detectable at a concentration of less than 1 ppm, which would signal people in a fire hazard to escape.[130] Two studies involving firefighters equipped with monitoring devices found that the peak carbon monoxide (CO) concentrations when entering burning buildings were higher than the 30-minute lethal exposure dose, whereas the peak HCl concentration was less than 10% of the corresponding 30-minute lethal exposure dose.[131]

Fires typically arise from electrical equipment in which leakage current flows over an extended period of time due to defection insulation or insulation damage.[132] In these circumstances, a relatively small amount of plastic material would be involved in comparison to the greater amount of combustible materials such as building materials, furnishings, and electrical equipment. In addition, concentrations of HCl that can be found in building fires are much smaller than would have been predicted from an analysis of the chlorine content of the burning material.[133] As noted above, carbon monoxide is the overwhelmingly important toxicant in fires, especially those that go to flashover.

One of the reasons that HCl causes less of a toxic concern than CO is that it decays rapidly by reacting with humidity and common construction materials, such as ceiling tile and gypsum board. In one experiment, a 30-foot length of electrical wire with flexible PVC jacket was decomposed in a plenum with an electrical overload. The maximum concentration of HCl in the plenum was only 35% of what would be predicted from the chlorine content of the burning material, and this amount decayed rapidly to approximately 3% in 45 minutes.[134] Another experiment showed that the decomposition of PVC-coated wire laid on the floor of a simulated plenum above a room did not result in the transport of HCl into the room below the plenum, although there was significant transport downward of CO, hydrocarbons, and carbon dioxide.[135] The HCl decayed very rapidly, corresponding to a half-life of 7 minutes, and had a reported concentration of less than 3%, even in the plenum. Most of the generated HCl reacted very rapidly with the ceiling tile and gypsum board surfaces and consequently was not easily transported to other rooms.

Experiments were also conducted to simulate the transport and decay of HCl in a simulated 400-foot-long HVAC ducting system.[136] Approximately 3,000 to 4,000 ppm of HCl was pumped into one end, and virtually no HCl was measured at the outlet. Results show that high concentrations of HCl are unlikely to reach rooms other than the one of fire origin and thus unlikely to seriously affect victims in a fire event.

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130 Vinyl Institute, "Fire and Polyvinyl Chloride," 12.

131 Ibid., 13.

132 Mazer, "Effects of Toxic Gases Emitted by Burning Electrical Insulation. *Electrical Contractor*, April 2000.

133 Ibid.

134 J. J. Beitel et al., "Hydrogen Chloride Transport and Decay in a Large Apparatus: I; Decomposition of PVC Wire Insulation in a Plenum by Current Overload," *Journal of Fire Sciences* 4, no. 1 (Jan/Feb 1986): 40.

135 M. M. Hirschler and F. M. Galloway, "Transport and Decay of Combustion Products in Fires," proceedings of Symposium on Hazards of Combustion Products: Toxicity, Opacity, Corrosivity and Heat Release, London, UK, November 2008, 76.

136 Ibid., 79.

Hydrogen bromide (HBr) and hydrogen fluoride (HF) are two other common halogen acids that can result from the decomposition of flame retardant wrappings or FEP-jacketed cables in fires.[137] Less research has been done on the combustion products of these compounds than PVC, but they are expected to behave in a similar manner as HCl.[138] Some studies indicate that FEP compounds would result in much lower acid gas generation rates than PVC, and therefore would not pose a significant concern to occupants or firefighters in the case of a plenum fire.[139] As discussed above, PVC products behind fire-rated ceilings or in plenum spaces did not cause an increased fire risk to occupants.

Other Toxins: Dioxins

The previous public comments also indicated concerns that dioxins, which are highly toxic and carcinogenic, would be formed during the burning of PVC materials. Dioxins are a group of toxic compounds formed during combustion processes, such as waste incineration, forest fires, and some industrial processes. Residential wood burning is the third largest source of dioxin in the United States. Any process involving combustion in the presence of chlorine can lead to the formation of dioxins under certain temperature and oxygen conditions. Chlorine occurs in PVC compounds but also occurs naturally in wood. Top sources of dioxin emissions in the US since 1995 are backyard barrel burning, medical waste incineration and municipal waste combustion.[140] Laboratory analyses have shown that the formation of dioxin during the combustion of PVC was extremely low, less than 0.00001 ppm.[141]

The health hazards from exposure to dioxins arising from the combustion of PVC should be considered in relation to the health hazards presented by other combustion products from PVC in building fires, such as HCl and CO, discussed above. Carbon monoxide is the most important byproduct from fires and is at much higher concentrations than other byproducts; it is the primary cause of death in most fires. There is no mention of dioxins as a combustion product of fires in the NFPA Fire Protection Handbook.[142] There is a potentially small but significant health risk for firefighters in contact with soot that contains dioxin byproducts from flame retardants in household materials. This would occur from exposure to fires on a regular basis due to the tendency of dioxin to bioaccumulate.

Impact Analysis

Fire risk associated with plenum space in buildings primarily relates to the movement of air combined with the presence of potentially flammable materials, especially cables used for data and other forms of

137 Ibid., 85.

138 Ibid., 85.

139 David B. Kiddoo, "Cable Component Material Innovations for Stringent Fire Safety and Environmental Compliance Requirements," proceedings of the 56th International Wire and Cable Symposium, November 2007, 205–6.

140 USEPA, "An Inventory of Sources and Environmental Releases of Dioxin-Like Compounds in the United States for the Years 1987, 1995, and 2000," EPA Document No. EPA/600/P-03/002F, November 2006, xlvi. An update was prepared in January 2013 which affirmed backyard trash burning as the single largest quantifiable source.

141 J. Vikelsoe and E. Johansen, "Estimation of Dioxin Emission from Fires in Chemicals," *Chemosphere* 40, no. 2 (January 2000): 165–175.

142 National Fire Protection Association, "Combustion Products and Their Effects on Life Safety," sec. 6, ch. 2 in *Fire Protection Handbook*, 20th ed. (2008), 6-11–6-34.

communication.[143] In response to such concerns, Underwriters Laboratories (UL) developed a test method to qualify cables for plenum service that would meet stringent fire standards— UL 910.[144] The test evaluates both cable burn properties and smoke density. The cables must have a flame spread of less than 5 feet beyond the end of the 4.5-foot ignition flame, a peak optical density of 0.5 maximum, and a maximum average optical density of 0.15.

The NFPA 90A *Standard for the Installation of Air Conditioning and Ventilating Systems* establishes requirements for materials within plenum space. Materials, including plastic piping and tubing used in plumbing systems located within a ceiling plenum exposed to airflow shall 1) be noncombustible or 2) exhibit a maximum flame spread index of 25 and a maximum smoke developed index of 50. Electrical wires, cable, and optical fiber cables must have a maximum flame spread distance of 1.5 m (5 feet) or less when tested in accordance with UL910/NFPA 262. These requirements are also incorporated in the CMC and CFC. With these stringent code requirements, the likelihood of fires occurring in the plenum spaces is greatly reduced.

In addition, fire statistics pertaining to health care facilities indicate that fires at clinics or doctor's offices are rare. Only 11% of all health care facility fires occurred at clinics or doctor's offices, and the majority of these fires were related to cooking equipment. Only 2% of all fires in clinics or doctor's offices occurred in ducting for HVAC, cable, exhaust, heating, or air conditioning, and only 2% of the fires occurred in a ceiling/roof assembly or concealed space. In addition, NFPA statistics have shown that as the quantity of plenum cables have increased exponentially between the period of 1980 and 1998, the number of fires associated with concealed spaces has decreased. Therefore, the likelihood of a fire occurring at a clinic is low, and the probability of that fire occurring in a plenum space is very low.

Also, toxicity tests have shown that PVC wire coatings on plenum cables as well as polyolefins and fluoropolymers are within the range of commonly used construction materials, including Douglas fir. Further, studies have shown that the toxicity of fire environments is determined almost exclusively by carbon monoxide. The generation of hydrogen chloride with the thermal decomposition of PVC compounds is subject to rapid decay and absorption onto common construction surfaces, such as ceiling tile and gypsum board. It does not incapacitate or become dangerous at concentrations measured in actual fires. Further, the proposed code change would not result in a significant exposure to dioxins, even in the unlikely event of a fire. Accordingly, the risk of fire toxicity associated with these materials in plenum is very low.

One concern is the conversion of existing occupancies to OSHPD 3 clinic spaces. It is postulated that cables within the plenum spaces of existing occupancies may not meet the UL910/NFPA 262 flammability and smoke standards. The UL 910 test was incorporated into the NFPA 90A standard in the early 1980s, and plenum-rated cables have been part of the code for more than 30 years.

It is possible that in-place unused or abandoned cable could be present in existing occupancies and could constitute a hidden fire hazard, interfering with air flow and leaving no room for new cable. However, NFPA 90A requires all old and abandoned cables in the plenum space of existing buildings to be removed. These

[143] Stanitis and Donmann, "The Evolution of Plenum Cable Fire Standards."

[144] J. Thomas Chapin and Pravinray Ghandi, "International NFPA 262 Fire Test Harmonization Project: A Horizontal Integrated Fire Test," Fire Protection Research Foundation, March 2000.

requirements are incorporated into the CEC, and buildings must be code compliant prior to certification by the enforcing agency. Even if the requirement to abandon cable in conformance with the CEC was disregarded after certification (new construction or conversion of existing buildings) and abandoned cables left in place, the risk of fires in plenums in health care facilities is low. Accordingly, the risk of substantial increase in fire risk associated with this condition is also low.

Finally, the CSBC contains several provisions to protect lives in the event of fire. Notably, the use of automatic sprinklers, smoke detectors, and alarms in all ambulatory care facilities provides high levels of protection to patients who are least capable of exiting a facility in the event of a fire. While only a small percentage of all fires (2%) in clinics or doctor's offices occurred in a duct for HVAC, cable, exhaust, heating, or air conditioning, and a small percentage (2%) of all fires occurred in a ceiling/roof assembly or concealed space, these fire protection systems provide additional life safety protections for this vulnerable population. Further, there is a growing trend among municipalities to require automatic fire sprinklers in all Group B occupancies, which would include OSHPD 3 facilities not meeting the Group I-2.1 or ambulatory care facilities definition. Other code requirements related to automatic shutdown of air-handling units minimize the spread of fire in plenum spaces, and fire-resistive construction techniques are incorporated into the building design to withstand fire exposure conditions for specific periods of time without allowing fire to spread from the initially impacted areas.

Because plenum space used for return air would be required to meet the standards specified in NFPA and CBSC, all cables located within such plenum space would be plenum-rated and meet stringent flame spread and smoke requirements. Further, the fire toxicity in the plenum is concluded to be low based on the studies addressing PVC and FEP toxicity. Halogen acids are likewise of little concern relative to plenum spaces based on the similarities with PVC and FEP. The risk of toxic exposure to dioxins from a single fire is also determined to be low; the identified risk is a firefighter's exposure to dioxins over time from soot. According, the project's effects in terms of causing or substantially contributing to increased risk of fire spread is considered **less than significant**.

CUMULATIVE IMPACT ANALYSIS

OSHPD is also proposing changes to the California Plumbing Code (CPC) that would allow for plastic plumbing pipes to be used at OSHPD (1, 2, 3 & 4) facilities. The following materials would be allowed pursuant the proposed change.

- Chlorinated polyvinyl chloride (CPVC) pipes, tubes, and fittings in water supply distribution systems
- Perfluoroalkoxy (PFA) in dialysis branch lines
- Acrylonitrile butadiene styrene (ABS) and polyvinyl chloride (PVC) piping installations in sanitary drainage systems
- ABS and PVC pipes and fittings for drain-waste-vent (DWV) systems

6. Environmental Analysis

- ABS and PVC piping installations for stormwater drainage systems

Of these plumbing systems, there is the potential for short or long runs of water supply lines and drain-waste-vent (DWV) systems in plenum spaces of OSHPD 3 clinics. These pipes are usually located within cavity walls (i.e., the partition space between walls), but piping may occur in the plenum spaces. Water supply piping, including fire sprinklers currently allowed in the plenum, is usually of smaller diameter than DWV applications, is not vented, and is filled with water, thus reducing the risk of fire spread in the event of a fire.[145] The plastic piping of greater concern is the DWV systems, which are hollow and potentially combustible. All plastic piping installed in the plenum space would be required to comply with the requirements of NFPA 90A, which covers flame spread performance. Any piping materials located within a ceiling or floor plenum exposed to airflow shall either be noncombustible or exhibit a maximum flame spread index of 25 and a maximum smoke developed index of 50.

Plastic piping and tubing have low thermal conductivity, so the threat of fire ignition or fire spread due to temperature increases is low.[146] In addition, a database review of fires in the US during the past 40 to 50 years showed no unique hazard that links these products to unusual fire ignition or fire spread.[147] Also, fire-resistive construction techniques are incorporated into the building design to withstand fire exposure conditions for specific periods of time without allowing fire to spread from the initially impacted areas. This includes code requirements for hourly ratings of walls and floor/ceiling assemblies and firestopping for through penetrations.

There could be the potential for combustion products from burning plastic pipe to impact building occupants. However, the amount of piping material is relatively small when compared to other construction materials and furnishings. As described previously, the combustion products are not more toxic than other building materials and would not pose a significant toxic hazard or threat. Therefore, people occupying the OSHPD 3 clinics would *not* be exposed to increased risk of injury or death from fire, and the cumulative impact is considered **less than significant**.

[145] Joseph B. Zickerman, "Plastic Pipe and Fire Safety," paper for submission to *NFPA Fire Journal* (September 5, 2000): 16.

[146] Ibid., 24.

[147] Ibid., 25.

6.9 HYDROLOGY AND WATER QUALITY

Would the project:

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements?				X
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g. the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?				X
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner, which would result in substantial erosion or siltation on- or off-site?				X
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner, which would result in flooding on- or off-site?				X
e) Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems?				X
f) Otherwise substantially degrade water quality?				X
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?				X
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?				X
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?				X
j) Expose people or structures to inundation by seiche, tsunami, or mudflow?				X

Comments:

a) Violate any water quality standards or waste discharge requirements?

No Impact. The project is a proposed regulatory change and would not directly violate any water quality standards or discharge requirements. Project implementation would provide for additional ventilation design and installation alternatives within certain areas of OSHPD 3 outpatient clinics. Installation of plenum return air does not involve ground-disturbing activities that could discharge pollutants to stormwater. Further, the changes would not increase impervious areas. Site-specific clinics constructed under the proposed regulations

would still be required to adhere to existing regulations for construction-related stormwater pollution control. No impact would occur.

b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g. the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?

No Impact. The proposed project is not site specific and therefore would not raise concerns related to groundwater. Upon project implementation, the proposed regulatory change would afford more design and installation options related to ventilation systems within certain rooms and spaces. The project would not indirectly impact groundwater supplies or interfere with recharge, because all work would occur within the building envelope. Further, as described in Section 6.17(d), the proposed changes would not increase demand for water services within clinics. No impact would occur.

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner, which would result in substantial erosion or siltation on- or off-site?

No Impact. The project would not directly or indirectly alter existing drainage patterns of a site or area because it involves a regulatory change regarding plenum return air inside concealed building spaces. This change would not have any impact on drainage patterns as compared to existing requirements for fully ducted return systems. No impact would occur.

d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner, which would result in flooding on- or off-site?

No Impact. For the reasons discussed in Section 6.9(c), no impact would occur.

e) Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems?

No Impact. Design and installations of systems at specific sites pursuant to the proposed project would not change runoff rates or volumes—as substantiated above in Sections 6.9(a) and (c)—and thus would not impact existing or planned storm drainage capacity. No impact would occur.

f) Otherwise substantially degrade water quality?

No Impact. Work pursuant to the proposed project would not substantially degrade water quality, as substantiated above in Section 6.9(a). No impact would occur.

g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

No Impact. The project would not involve placement of housing within a 100-year flood hazard area or other delineation map. The proposed project is a regulatory change to allow for additional design and installation options for plenum return air within certain areas of OSHPD 3 outpatient clinics. No impact would occur.

h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?

No Impact. The project itself would not place any structures within a flood hazard area as it is a proposed regulatory change related to ventilation systems. Site-specific clinics constructed pursuant to the proposed project may be placed in flood hazard areas. However, the project would not affect any of the existing regulations and requirements related to structures within flood hazard areas. Accordingly, no impact would occur.

i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

No Impact. Areas protected from 100-year floods by levees are one of several types of moderate flood hazard zones designated Shaded Zone X by the Federal Emergency Management Agency (FEMA). As discussed in Section 6.9(h) above, the project would not directly involve placement of structures in any area. Indirectly, clinics may be sited within areas of dam inundation. However, the project would not alter any of the existing regulations and requirements related to flooding hazards. Accordingly, no impact would occur.

j) Expose people or structures to inundation by seiche, tsunami, or mudflow?

No Impact. A seiche is a surface wave created when an inland water body is shaken, usually by an earthquake. Inland water bodies that could pose flood hazards due to a seiche include lakes and aboveground water storage tanks. A tsunami is a sea wave caused by a sudden displacement of the ocean floor, most often due to earthquakes. Finally, a mudflow is a landslide composed of saturated rock debris and soil with a consistency of wet cement. As discussed in the above sections, as a proposed regulation change, the project is not site specific and therefore would not directly expose people or structures to these risks. Upon implementation, the project would afford additional design and installation options related to plenum return air within certain areas of OSHPD 3 outpatient clinics. These changes would not impact the siting of future clinics in areas subject to these risks any more than existing requirements, since they would occur within the building envelope. No impact would occur.

6.10 LAND USE AND PLANNING

Would the project:

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Physically divide an established community?				X
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?				X
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?				X

Comments:

a) Physically divide an established community?

No Impact. The project is not site specific and therefore would not have any direct impacts on established communities. Further, the proposed regulatory change only relates to ventilation features within the building envelope. Therefore, design and installation of systems pursuant to the project would not divide established communities. No impact would occur.

b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?

No Impact. The project is not site specific and therefore would not directly affect land use planning or conservation plans. Future clinics would be required to adhere to applicable local land use, policies, and regulations adopted by local jurisdictions. The project does not affect these local policies or controls. Accordingly, no impact would occur.

c) Conflict with any applicable habitat conservation plan or natural community conservation plan?

No Impact. As discussed above, because the project is not site specific, it does not directly conflict with conservation plans. Further, the project would not alter any existing regulations related to conservation plans vis a vis clinic siting. No impact would occur.

6.11 MINERAL RESOURCES

Would the project:

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be a value to the region and the residents of the state?				X
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?				X

Comments:

a) Result in the loss of availability of a known mineral resource that would be a value to the region and the residents of the state?

No Impact. The project is a proposed regulatory change related to plenum return air in certain spaces of OSHPD 3 clinics. Design and installation of systems pursuant to this change would also not be expected to result in the loss of availability of known mineral resources. In fact, the ability to use plenum return air in place of rigid metal ducting may reduce the use of mineral resources in the production of sheet metal. No adverse impact would occur.

b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

No Impact. As discussed in Section 6.11(a), because the project is not site specific, it would not directly impact locally important resource recovery sites on local plans. The regulatory change proposed by the project would also not be reasonably expected to indirectly influence clinic siting relative to recovery areas. Site-specific clinics would be subject to existing regulations and requirements—including general, specific, and other land use plans—regulating development within these areas. The project would not affect these regulations or requirements, and therefore no impact would occur.

6.12 NOISE

Would the project result in:

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?			X	
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?				X
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?				X
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?				X
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				X
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?				X

Comments:

a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Public comments received by OSHPD regarding similar changes proposed to the 2013 CMC identified that proposed removal of the requirement for fully ducted HVAC systems was a potential source of noise impacts inside of clinics. The expressed concerns were for potential adverse noise impacts on patients and staff and potential loss of patient privacy due to "cross-talk," wherein audible conversations are transmitted between rooms. HVAC systems in general may impact the noise environment of health care clinics. An evaluation of the potential for the project to increase indoor ambient noise levels such that levels would exceed applicable standards in OSHPD-3 facilities is provided below.

Regulatory Setting

FEDERAL PLANS, POLICIES, REGULATIONS AND LAWS

The Noise Pollution and Abatement Act of 1972[148] and the Occupational Safety Administration Noise Exposure Standard[149] are aimed at regulating noise pollution with the intent of protecting human health and

[148] 42 USC §§ 4901–4918.

minimizing annoyance to the general public. The thrust of the former is on community noise reduction (outdoor noise exposure), and the latter addresses occupational hearing conservation programs for general industry workers (e.g., manufacturing and utilities). While the regulations and standards have no direct application, they are noted because they were precursors to many State-established noise regulations.

STATE PLANS, POLICIES, REGULATIONS AND LAWS

California Noise Control Act of 1973 (H&SC, Division 28, Chapters 1 through 8)

Following the passage of the federal Noise Control Act of 1972, the legislature desired to establish an overall policy for the State. In 1973, it passed the California Noise Control Act to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. Much like the federal Noise Control Act, this is primarily concerned with regulating noise pollution in order to protect human health and minimize annoyance to the general public. This is principally evidenced in its focus on assisting local jurisdictions in the preparation and updating of noise elements. The California Noise Insulation Standards establishes inter-dwelling and exterior sound transmission control measures, but only applies to habitable room of a multi-residential use facility (e.g., hotels, motels, dormitories, long-term care facilities, and apartment houses).[150]

California Building Code (CBC) (CCR Title 24, Part 2)

Chapter 12 - Interior Environment

The CBC establishes noise requirements for OSHPD 1 facilities by area. Section 1224.5, Noise Control, establishes minimum sound transmission class (STC) values for defined pairs of facility spaces, such as 45 STC between two treatment rooms or 55 STC between a treatment room and a public space. Further, section 1224.29.2.7 establishes minimum noise reduction coefficient (NRC) ratings for ceilings. The only specific noise requirements for OSHPD 3 clinics pertain to audiology spaces. Section 1226.19.3 states that at least one 2-room testing unit that meets the requirements of ANSI Standard S3.1, 1960 (R-1971) must be provided. There are no other acoustic requirements for OSHPD 3 facilities established by OSHPD.

California Mechanical Code (CMC) (CCR Title 24, Part 4)

Chapter 6 - Duct Systems

604.0 Insulation of Ducts

604.2 [OSHPD 1, 2, 3 (surgical clinics) & 4] Thermal acoustical lining may not be installed in ducts, boxes, sound traps, and other in-duct systems serving specified areas unless terminal filters with 90% average efficiency or MERV 14 are installed downstream of the duct lining.

California Green Building Standards Code (CALGreen) (CCR Title 24, Part 4)

CALGreen was first adopted in to the CBSC in 2010 and establishes planning and design standards for sustainable site development, energy efficiency, and water and material conservation. CALGreen Code was

149 9 CFR § 1910.25.

150 24 CBC § 1207, Sound Transmission.

not adopted in its entirety for OSHPD facilities. Appendix A6.1 identifies the voluntary standards for OSHPD 1, 2 & 4 facilities. While there are no mandatory or voluntary measures for OSHPD 3 facilities, the nonresidential (commercial) building classification triggers compliance with CALGreen The code applies to newly constructed nonresidential buildings; nonresidential building additions of 1,000 square feet or greater; and/or nonresidential building alterations with a permit valuation of $200,000 or above.

Chapter 5 - Nonresidential Mandatory Measures

Section 5.507 Environmental Comfort

507.4 Acoustical Control.

Requires ceiling assemblies and components with STC values in accordance with ASTM E 90 and ASMT E 413 or Outdoor-Indoor Sound Transmission Class (OITC) per ASTM E 1332, using prescriptive or performance-based approach, excepting buildings with few or no occupants or where unlikely to be affected by exterior noise.

5.507.4.3 Interior sound transmission. Wall and floor-ceiling assemblies separating tenant spaces shall have an STC of at least 40.

Environmental Setting

NOISE AND ACOUSTICS BASICS

Noise is most often defined as unwanted sound (e.g., loud, unpleasant or otherwise undesirable). Although sound can be easily measured, the perception of noise and the physical response to sound complicate the analysis of its impact on people. People judge the relative magnitude of sound sensation in subjective terms such as "noisiness" or "loudness." This section provides information on the fundamentals of sound, noise, and acoustics, followed by a discussion of the differences between outdoor and indoor noise environments and a presentation of the pertinent characteristics of room-to-room sound isolation. Further, unique acoustical challenges in health care facilities are presented below.

Noise Terminology and Descriptors

The following are brief definitions of pertinent architectural acoustics terminology used in this document:

Definitions

Sound. A disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.

Frequency. Frequency is the number of oscillations or cycles per unit time. In acoustics, frequency usually is expressed in units of Hertz (Hz) where one Hertz is equal to one cycle per second.

Decibel (dB). A unitless measure of sound on a logarithmic scale. The decibel denotes the ratio between two quantities that are proportional to power, energy, or intensity. One of these quantities is a designated reference by which all other quantities of identical units are divided. The sound pressure level in decibels is

equal to 10 times the logarithm (to the base 10) of the ratio between the pressure squared divided by the reference pressure squared. The reference pressure used in acoustics is 20 micro-pascals.

A-Weighted Decibel (dBA). An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear. The human ear is most sensitive to sound at mid frequencies (500 to 4,000 Hz) and is progressively less sensitive to sound at frequencies above and below this range. A-weighted sound level is the most commonly used descriptor to quantify the relative loudness of various types of sounds with similar or differing frequency characteristics.

Absorption. The attenuation (or reduction) of sound level that results when sound propagates through a medium (usually air) or reflects from a dissipative material (sound absorptive material) such as glass fiber or open-cell urethane foam. In the case of sound absorptive materials used in the building industry, attenuation of sound is produced by the conversion of molecular motion, which is sound, into thermal energy due to friction of air molecules within fibrous or cellular materials.

Articulation Index (AI). A number (from 0 to 1) that is a measure of the intelligibility of speech. The higher the number, the greater the intelligibility. This sound metric is defined in ANSI Standard S3.5-1969, but has been replaced by the Speech Intelligibility Index (SII).

Damping. Damping is the dissipation of vibratory energy in solid media and structures with time or distance. It is analogous to the absorption of sound in air.

Flanking. The transmission of sound around the perimeter or through holes within partitions (or barriers) that reduces the otherwise obtainable sound transmission loss of a partition. Examples of flanking paths within buildings are ceiling plena above partitions; ductwork, piping, and electrical conduit penetrations through partitions; back-to-back electrical boxes within partitions, window mullions, etc.

Mass. Mass is the fundamental property of a material relevant to sound transmission loss through that material. Generally, the more massive the material, the greater the sound transmission loss.

Noise Criteria (NC) Curves. A series of curves of octave-band sound spectra in a system for rating the noisiness of an occupied indoor space; an actual octave-band spectrum is compared with this set of curves to determine the NC level of the space.

Noise Reduction between Rooms. The arithmetic difference between the sound level in a source room and the sound level produced by that source in an adjacent receiving room. The noise reduction (NR) is expressed in decibels.

Plenum. The ceiling plenum is the volume defined by the area above the back of the ceiling tile and below the bottom of the structural slab above. Within this plenum is usually found a combination of HVAC ducts, electrical and electronic conduits, water pipes, traditional masking sound speakers, etc.

Privacy Index (PI). A measure for rating the speech privacy performance of an architectural space (or lack of speech intelligibility) where the PI is calculated from the Articulation Index (AI) according to the following: PI = (1 – AI) * 100%. A privacy level of PI > 95% represents confidential speech privacy, a PI

between 95% and 80% represents normal or nonintrusive privacy, and PI < 80% is poor privacy. The technical definition is given in ASTM Standard E1130.

Reverberation. Reverberation is the persistence of sound in an enclosed space resulting from multiple reflections after a sound source has stopped.

Sound Absorption. Sound absorption is the property possessed by materials and objects, including air, of converting sound energy into heat energy.

Sound Emission. The sound energy that is emitted or sent outward by one or more sources. This is relatively independent of the environment in which the noise source(s) is located (i.e., outdoors, in a room, etc.). [151]

Sound Transmission Loss. Sound transmission loss (TL) of a material or building partition is a measure of sound isolation ability. Expressed in decibels, it is 10 times the logarithm to the base 10 of the reciprocal of the sound transmission coefficient of the partition. Mathematically, this is represented as:

$TL = 10 \log 1/t$

Unless otherwise specified, the sound fields on both sides of the partition are assumed to be diffuse.

Sound Transmission Class (STC). A single number rating of partition airborne sound transmission loss across 16 one-third octave bands between 125 Hz and 4,000 Hz as measured in an acoustical laboratory under carefully controlled test conditions. The STC is used during the building design phase to select a particular partition/window configuration to obtain desired sound isolation performance.

Speech Intelligibility Index (SII). An index that is calculated from acoustical measurements of speech and noise. The computed number is highly correlated with the intelligibility of speech as evaluated by speech perception tests given a group of talkers and listeners. The technical definition is given in ANSI Standard S3.5-1997 and replaces the older Articulation Index (AI) metric.

Speech Transmission Index (STI). An index for rating the intelligibility of speech that takes both noise and reverberation into account. The technical definition is given in IEC 60268-16.

CHARACTERISTICS OF SOUND

When an object vibrates, it radiates part of its energy as acoustical pressure in the form of a sound wave. Sound can be described in terms of amplitude (loudness), frequency (pitch), or duration (time). The human hearing system is not equally sensitive to sound at all frequencies. Therefore, to approximate the human, frequency-dependent response, the A-weighted filter system is used to adjust measured sound levels. The normal range of human hearing extends from approximately 0 dBA (the threshold of detection) to 140 dBA (the threshold of pain).

[151] In contrast, sound immission refer to the sound energy that is heard or received (immitted) by an observer and is used to differentiate the sound source from the sound receptor.

Unlike linear units such as inches or pounds, decibels are measured on a logarithmic scale. Because of the physical characteristics of noise transmission and perception, the relative loudness of sound does not closely match the actual amounts of sound energy. Table 6 presents the subjective effect of changes in sound pressure levels.

Table 6 Change in Apparent Loudness

± 3 dB	Threshold of human perceptibility
± 5 dB	Clearly noticeable change in noise level
± 10 dB	Half or twice as loud
± 20 dB	Much quieter or louder

Source: Bies and Hansen, 2009.

Since most people do not routinely work with decibels or A-weighted sound levels, it is often difficult to appreciate what a given sound pressure level (SPL) number means. To help relate noise level values to common experience, Table 7 shows typical noise levels from common sources, both exterior and interior.

Table 7 Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock Band
Jet Flyover at 1,000 feet		
	100	
Gas Lawn Mower at three feet		
	90	
Diesel Truck at 50 feet, at 50 mph		Food Blender at 3 feet
	80	Garbage Disposal at 3 feet
Noisy Urban Area, Daytime		
	70	Vacuum Cleaner at 10 feet
Commercial Area		Normal speech at 3 feet
Heavy Traffic at 300 feet	60	
		Large Business Office
Quiet Urban Daytime	50	Dishwasher Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (background)
Quiet Suburban Nighttime		
	30	Library
Quiet Rural Nighttime		Bedroom at Night, Concert Hall (background)
	20	
Very Remote & Unpopulated Area Nighttime		Broadcast/Recording Studio
	10	
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

Source: Caltrans 2009.

6. Environmental Analysis

OUTDOOR VS. INDOOR SOUNDS

In order to fully appreciate how sound behaves inside rooms and is transmitted from space to space within buildings, it is helpful to consider first how sound behaves outdoors. In an outdoor soundscape, the sound intensity of a simple nondirective source will fall off (diminish) as the distance from the source increases. That is, the sound wave moving outward from the source spreads its energy over an ever-increasing spherical area. This sound energy dissipation occurs exponentially with distance from the noise source.[152] This phenomenon is known as spreading loss or distance attenuation. In addition, some further losses (or gains) may be present in real life situations due to atmospheric effects, wind, temperature, ground foliage, and so forth. However, these effects can usually be neglected for first-order approximation of expected sound losses outdoors where distances are not very large.

On the other hand, for indoor sound propagation, sound intensity will fall off with distance only very near the source (in most building situations, within several feet). As one continues to move away from the source, the reflected sound from the floor, walls, and ceiling of the room begins to overwhelm the direct sound component that continues to be emitted from the source. Within the reflected or so-called reverberant sound field, the sound level remains generally constant throughout the room no matter how far away from the source a listener is. If the room surfaces are basically hard and sound reflective (plaster, concrete, glass, etc.), there will be very little loss of sound at each impact of the sound wave with the room surfaces, and the built-up reflected sound level will be relatively high. If soft, porous materials (rugs, draperies, acoustical tiles, etc.) are placed on the room surfaces, there will be appreciable losses each time the reflected sound waves encounter the room surfaces. Accordingly, the built-up reflected sound levels will be lower. This is the principal effect of placing sound-absorbing materials on the surfaces of rooms (i.e., to lower the sound level in the reverberant acoustic field dominated by reflected sound). Ultimately, if completely efficient sound-absorbing materials are placed on all boundary surfaces of a room, outdoor conditions would be approximated and only the direct sound would remain.[153]

Additionally, for interior acoustics, considerations must be made for achieving an appropriate degree of "quietness." To achieve "quiet" requires reducing both background sound and intrusive speech levels. Background sound may come from outside sources (such as roadway or aircraft noise) as well as from intra-facility sources (such as HVAC equipment or water flowing through piping). So the thrust of appropriate architectural acoustics design is to examine methods for (a) increasing the transmission loss (TL) of walls to reduce exterior-to-interior sound transmission, (b) reducing the generation of noise from mechanical (and piping systems) within wall/floor/ceiling spaces, and (c) reducing unintentionally transmitted speech sounds between units/rooms. With respect to the project's proposed changes to ducting and plenum designs, this last item—reducing unintentionally transmitted speech sounds between units/rooms—is of primary importance.

152 Specifically, as the radius of the sphere over which the sound energy has spread is doubled, the associated spherical area is four times greater, so sound level is reduced by 10 log 4, or 6 dB. This is the basic "inverse square law" for sound energy propagation and leads to the common fall-off relationship of –6 dB for every doubling of distance (from the source in free-field conditions).

153 Note that the application of absorbing materials on the room surfaces does not affect in any way the direct sound that continues to decay with distance from the source.

ROOM-TO-ROOM SOUND ISOLATION

Room-to-room sound isolation (or insulation) is a function of the potential sound pathways between the two spaces. Nominally, the primary determining factor of sound isolation is the transmission loss of the common wall between the rooms. This wall transmission loss is determined by a combination of inherent properties of the wall, including the assembly's stiffness, resonance, mass, damping, and bending or shear characteristic, all of which are dependent on the frequency content of the sounds considered.

However, beyond this fundamental transmission loss of the common wall between the rooms, potential flanking (or leakage) pathways can—and often do—play a more important role in determining the effectiveness in acoustically isolating two or more adjacent rooms than simply the nominal wall transmission loss. These flanking pathways can include the wall design above the ceiling, the ceiling materials (e.g., drywall or T-bar suspended panels), sound-absorbing materials above the ceiling, the care in caulking/sealing wall panel junctions, the electrical power junction box configuration, and supply or return air pathways (ducts or plenums).

For example, HVAC ducts can serve as a conduit for sound transmission between adjacent rooms. Likewise, for rooms with a common plenum space above the ceiling, sound from one room can potentially travel out of the first room, into the plenum space, and into adjoining rooms served by the same plenum space. However, there is no feasible way to directly compare potential sound transmission through a ducted return air system versus through a plenume return air system without substantial additional details of facility ventilation designs on a case-by-case basis. That is, details of ducting materials, thicknesses, insulation materials (for both interior liners and exterior cladding), register sizing, flow parameters, run lengths, directional change devices (e.g., elbows), inclusion of in-duct silencers, and the like would have to be compared with corresponding details of plenum dimensions, above-ceiling insulation materials, register sizing, flow parameters, inclusion of sound-absorbing "boots," and/or the use of above-ceiling sound masking systems to make a definitive comparison between ducting and plenum return air configurations. In short, there is no practical or reasonable way to establish a general statement that ducted return air systems are better (or worse) than plenum return air systems with regard to room-to-room sound isolation characteristics.[154, 155]

INDUSTRY GUIDELINES

As discussed in the Regulatory Setting, there are no specific acoustical requirements for OSHPD 3 clinics or, in fact, non-licensed clinics. Noise insulation standards were developed for habitable spaces in California for hotels, motels, apartment houses, and dwellings other than detached single-family dwellings. A discussion of guidelines pertaining to health facilities is provided below.

FGI Guidelines

In 2010, FGI introduced comprehensive acoustical criteria for health care facilities into its *Guidelines for Design and Construction of Health Care Facilities*. The *Sound & Vibration Design Guidelines for Health Care Facilities* serves as

[154] William J. Cavanaugh and Joseph A. Wilkes, eds., *Architectural Acoustics: Principles and Practice* (New York: John Wiley & Sons, 1999).
[155] Marshall Long, *Architectural Acoustics* (Burlington, MA: Elsevier Academic Press, 2006).

the sole acoustical reference for the Guidelines. Although adoption of the Guidelines varies by state, at least 42 states use them in some form. As discussed in the Regulatory Setting, there are no acoustical requirements imposed on OSHPD 3 facilities, specifically. However, requirements for OSHPD 1 facilities are based in part on these guidelines. In 2014, as discussed in Section 2.2.1, FGI incorporated the full text of *Standard 170-2013: Ventilation of Health Care Facilities.*

American Society for Testing and Materials (ASMT)

ASTM has developed approximately 50 standards and guides that establish methods for analyzing, measuring, and otherwise quantifying a variety of acoustical properties of building materials and systems. These standards establish methods of measuring transmission, determining STC ratings, and test methods for laboratory and *in situ* noise metric studies.[156] These technical standards for measurement and quantification are typically included as "how-to" references within the building design standards.

American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE)

ASHRAE long preceded ANSI in defining criteria for sound inside building spaces by recommending sound levels for mechanical systems in a variety of building spaces.[157] ASHRAE publishes several handbooks and design manuals for the HVAC industry that deal specifically with noise (and vibration) in ventilation systems. These include ASHRAE's *HVAC Design Manual for Hospitals and Clinics,* Chapter 3, "Air-Handling and Distribution Systems"; *Noise and Vibration Control for HVAC Systems;* and several handbooks, including Chapter 8 of *The ASHRAE Handbook: Fundamentals,* "Sound and Vibration," and Chapter 48 of *The ASHRAE Handbook: HVAC Applications*, "Noise and Vibration Control."

HEALTH CARE FACILITIES AND ACOUSTICS

Hospital settings (primarily defined per OSHPD 1 design goals under CBC 1224) have markedly different acoustical needs than do clinics (primarily defined per OSHPD 3 design goals under CBC 1226). For hospitals, the inherent background noise conditions are generally higher than for clinics due to additional sound sources (in the former), such as paging systems, monitoring equipment (with audible indicators and alarms), added employee conversations (such as at nursing stations), and phone systems. Conversely, the lack of such additional sound sources in OSHPD 3 clinic settings means that sound isolation within such a facility is not needed to the same degree as for a hospital setting.

Additionally, the typical overnight or multiple-day visit of patients within a hospital setting raises the concerns about patient privacy to a higher level than for the minutes or hours of a typical visit at an OSHPD 3 clinic. That is, the longer duration of any given stay at a hospital is much more likely to result in the potential loss of patient privacy—compared to the relatively short duration for a clinic visit—and, as a result, there is the need for a more robust guideline for room-to-room isolation in a hospital setting.

Most importantly in a hospital setting, there is a need to optimize, as much as possible, conditions that are conducive to promoting patient sleep patterns that help with recuperation. Such conducive sleeping

156 See ASTM E90-09, E413-10, E492-10, E336-14, and E1130-8.
157 Cavanaugh and Wilkes, *Architectural Acoustics.*

conditions would be facilitated by a high degree of sound isolation between rooms so that sounds in any given room did not transmit to adjacent rooms, potentially disturbing adjacent patients. This is demonstrated in the establishment of CBC subsection 1224.5 for OSHPD 1 facilities that defines minimum STC values between hospital spaces. Conversely, with no overnight stays or recuperative sleep needs with OSHPD 3 clinics, minimum space-to-space STC requirements for sound isolation (analogous to CBC 1224.5 for OSHPD 1 facilities) have not been established in the CBC.

For both types of OSHPD settings, the need for effective sound absorption to help isolate spaces from each other and to "soak up" general sound energy is somewhat constrained by the contending need to maintain cleanliness in a medical facility. That is, to reduce the likelihood of infectious agents, dirt, or contagions being harbored on surfaces, it is imperative that floors, walls, and ceilings are able to be cleaned thoroughly and that such surfaces do not have open structures. Unfortunately, materials with open structures (such as in foams, fiber insulation, carpeting, and padding) are also generally efficient at absorbing and dissipating sound energy. Thus, for example, the use of carpet in patient treatment rooms is not a prudent design concept for either hospitals or clinics because the need for cleanliness overrides the desire for acoustical performance in such surfaces. As a result, sound-absorptive materials in a health care facility have to be cleanable, while still maintaining reasonable acoustical properties. This constraint can limit the types of materials that are allowable in both duct linings and in open-return plenum spaces; for both OSHPD 1 and OSHPD 3 settings. Additional discussion on this point is contained in Section 6.3 *Air Quality and Public Health*.

Impact Analysis

Allowing the use of plenum return air for HVAC systems could potentially result in greater transmittance of sound energy between rooms in OSHPD facilities. Such sound energy transmittance would depend on a great number of design characteristics, materials selection, and installation particulars. These would include factors such as pathways, including ceiling plena above partitions; ductwork, piping, and electrical conduit penetrations through partitions; back-to-back electrical boxes within partitions; window mullions; caulking/sealing at joints; etc. HVAC ducts can be a conduit for sound transmission between adjacent rooms, particularly if the ducts are unlined. If an unlined duct directly connects diffusers in adjacent spaces, sound can propagate along the duct and be heard clearly in the receiving room. Likewise, in a return air system that simply utilizes a common plenum space (above a suspended, T-bar ceiling), sound from one room can potentially travel out of the first room, into the plenum space, and into all the adjoining rooms that are served by the common plenum space. Sound transmission between rooms using plenum return air versus unlined ducting is considered to be greater because noise can dissipate in a plenum space more readily.[158] And the difference between ducted air return and plenum air return is only one of many variables that come into play for how much sound transmission loss is both designed and actually achieved in any given facility configuration.

Since OSHPD 3 facility designs vary widely, no determination can be made as to how much influence the single proposed code change from ducted to a plenum air return would have on specific noise increases between rooms affected by the code change. As shown in Table 4, *OSHPD 3 Areas Subject to Code Change and*

158 Taylor, "Return Air Systems," 44.

6. Environmental Analysis

Air Exchange and Exhaust Requirements, the primary areas affected by the proposed change are administrative and support areas, and patient treatment and examination rooms. And, as discussed in the *Regulatory Setting*, there are no acoustic standards established in the CBSC for these rooms. The only room subject to specific requirements is audiology spaces (must provide at least one 2-room testing unit that meets the requirements of ANSI Standard S3.1, 1960 [R-1971] regarding background noise levels for adequate testing). Implementation of the proposed change would not compromise any building code or standard related to interior noise or room-to-room sound transmission. While there are several industry guidelines that establish recommendations for interior acoustics in health care settings, these guidelines are largely aimed at hospital environments (primarily under OSHPD 1 design goals), which have different and unique acoustical concerns regarding patient care than OSHPD 3 clinic facilities. Further, the State of California has not expressly adopted these guidelines into the CBSC. Accordingly, the project noise impact would be **less than significant.**

b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

No Impact. The proposed project is the adoption of statewide regulations for certain CMC changes related to plenum return air. The project would not expose people to or generate excessive groundborne vibration or groundborne noise levels. Further, implementation of the project would only affect design and installation choices for ventilation systems within certain rooms and spaces, all within the building envelope. The project would not impact siting of facilities, and therefore no indirect effects related to groundborne vibration or noise would occur.

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

No Impact. Implementation of the project would only affect the choice of design and installation of ventilation systems within certain rooms and spaces, all within the building envelope. The project would not impact outside ambient noise levels. No impact would occur.

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

No Impact. Implementation of the project would only affect the choice of design and installation of ventilation systems within certain rooms and spaces, all within the building envelope. The project would not impact outside ambient noise levels either temporarily or periodically, and no further analysis is warranted.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

No Impact. The project is not specific and would have no impact on exposure of persons working or living people either in an airport land use plan area or within two miles of a public airport. The regulatory change is related to changes in the plenum space, inside outpatient clinics. No impact would occur.

f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

No Impact. The project is not site specific and would not expose people to noise impacts associated with private airstrips. Further, implementation of the project would only affect the choice of design and installation of plenum return air within certain rooms and spaces, all within the building envelope. The project would not impact siting of facilities, and therefore no indirect effects related to private airstrip noise would occur. No impact would occur.

6.13 POPULATION AND HOUSING

Would the project:

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?				X
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				X
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				X

Comments:

a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

No Impact. The project is a regulatory change that would not directly induce substantial population growth by proposing new homes or businesses. In terms of indirect effects, the project also does not involve extension of roads or other infrastructure. The proposed changes apply only to OSHPD 3 outpatient clinics, which are generally smaller, community-serving facilities. A project objective is to facilitate development of clinics to serve existing community needs by reducing construction and conversion costs by allowing plenum return air in certain spaces. The project would not induce substantial population growth directly or indirectly. No impacts would occur.

b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?

No Impact. The project is a regulatory change and is not site specific. Accordingly, the project would not displace existing housing. Further, the changes would not impact siting decisions differently than existing code requirements. No impact would occur.

c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?

No Impact. Project implementation would not reasonably be expected to result in displacement of people, as substantiated above in Section 3.13(b). No impact would occur.

6.14 PUBLIC SERVICES

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Fire protection?				X
b) Police protection?				X
c) Schools?				X
d) Parks?				X
e) Other public facilities?				X

Comments:

a) Fire protection?

No Impact. As discussed in Section 6.8(i), concerns were raised in the 2013 proposed regulatory changes about increased fire risk associated with plenum return air ceiling spaces in certain OSHPD 3 clinics. The increased fire risk was determined to be less than significant. The project would not result in an increased demand for fire protection services relative to existing regulatory conditions, and no impact would occur.

b) Police protection?

No Impact. The project would not result in an increase demand for police protection services. The project proposes regulatory changes to allow additional ventilation design and installation options in certain areas of OSHPD outpatient clinics. Work performed pursuant to these changes would occur entirely within the building envelope. The project would also not affect any existing, applicable local impact fees for police services imposed on new construction or building conversion. No impact would occur.

c) Schools?

No Impact. Demand for schools is generated by the number of housing units in the schools' service areas. Project implementation would not develop housing units and thus would not create demand for schools.

Further, the project would not affect any existing, applicable local impact fees imposed on new construction or building conversion. No impact would occur.

d) Parks?

No Impact. Demand for parks is generated by the population in park service areas. The project would not cause population growth directly or indirectly as discussed in Section 6.13(a). Therefore the project would not increase demand for parks or require construction of new or expanded park facilities. Further, the project would not affect any existing, applicable local planning and building park impact fees imposed on new construction or conversion of existing buildings. No impact would occur.

e) Other public facilities?

No Impact. Demands for other public facilities, such as libraries, are generated by the population in the facilities' service areas. The project is not anticipated to result in demand on other facilities. As noted above for other services, the project would not affect locally imposed impact fees for other facilities. No impact would occur.

6.15 RECREATION

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?				X
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?				X

Comments:

a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities, such that substantial physical deterioration of the facility would occur or be accelerated?

No Impact. The proposed regulatory change would not reasonably be expected to increase demand on parks or other recreational facilities. The change relates to design and installation of ventilation systems in certain OSHPD 3 clinics. The project is not anticipated to induce population growth, which increases demand on park facilities. No impact would occur.

b) Does the project include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?

No Impact. The project does not propose development of recreational facilities and, as substantiated above in Section 3.14(d), would not require construction of new or expanded parks. No impact would occur.

6.16 TRANSPORTATION/TRAFFIC

Would the project:

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?				X
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?				X
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?				X
d) Substantially increase hazards due to a design feature (e.g. sharp curves or dangerous intersections) or incompatible uses (e.g. farm equipment)?				X
e) Result in inadequate emergency access?				X
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?				X

Comments:

a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?

No Impact. The project is a regulatory change that would provide additional design and installation options for plenum return air within certain areas of OSHPD 3 outpatient clinics. The project would not result in additional traffic demands, because the changes would occur within the building envelope. Further, the

project would not affect existing plans, ordinances, or policies affecting site-specific clinics developed pursuant to these regulations. No impact would occur.

b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?

No Impact. Congestion management programs are required in each California county with an urbanized area and 50,000 or more population. The program applies to all freeways and tollways and selected arterial roadways in a particular county. The proposed project involves changes inside the building envelope and would not affect the number of construction or operational trips associated with clinics developed through new construction and conversion of existing buildings. No impact would occur.

c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

No Impact. The project would not reasonably be expected to result in air traffic pattern changes because all design and installation of systems pursuant to the project would occur within the building envelope and would not affect building heights. Accordingly, no impact would occur.

d) Substantially increase hazards due to a design feature (e.g. sharp curves or dangerous intersections) or incompatible uses (e.g. farm equipment)?

No Impact. As discussed above, the project involves changes that would be confined to the building envelope. The project would not add incompatible uses to roadways near affected project sites and would not affect the layouts of roadways or intersections. No traffic hazard impact would occur.

e) Result in inadequate emergency access?

No Impact. The project is a regulatory change related to plenum return air and flexible ducting. No direct or indirect impacts on emergency access are anticipated. Upon implementation, the regulatory changes would provide for additional design and installation options in certain areas of OSHPD 3 outpatient clinics. The project would occur within the building envelope and be confined to inaccessible space (e.g., above ceilings). Accordingly, the project would not directly or indirectly result in inadequate emergency access.

f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

No Impact. The project relates to ventilation design and installation options inside certain areas of OSHPD 3 outpatient clinics. The regulations would not directly or indirectly affect policies, plans, or programs regarding alternative modes of transportation.

6. Environmental Analysis

6.17 UTILITIES AND SERVICE SYSTEMS

Would the project:

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Exceed waste water treatment requirements of the applicable Regional Water Quality Control Board?				X
b) Require or result in the construction of new water or waste water treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				X
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				X
d) Have sufficient water supplies available to serve the project from existing entitlements and resources or are new or expanded entitlements needed?				X
e) Result in a determination by the waste water treatment provider, which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?				X
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?				X
g) Comply with federal, state, and local statutes and regulations related to solid waste?				X
h) Result in inefficient, wasteful, and unnecessary consumption of energy?				X

Comments:

a) Exceed waste water treatment requirements of the applicable Regional Water Quality Control Board?

No Impact. The project is a regulatory change and is not site specific. The project would not directly violate any water quality standards or discharge requirements. Project implementation would provide additional ventilation design and installation alternatives within certain areas of OSHPD 3 outpatient clinics. As discussed in Section 6.9(a), these activities would not discharge pollutants to wastewater. Site-specific clinics constructed under the proposed regulations would still be required to adhere to existing regulations for construction-related stormwater pollution control. Accordingly, no impact would occur.

b) Require or result in the construction of new water or waste water treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

No Impact. The project is a regulatory change and is not site specific. The project would not directly impact demand for new water or wastewater treatment facilities. New construction and conversion of existing buildings for clinics with project implementation would not increase water or wastewater demands compared to clinics developed under existing regulations, because plenum return air systems do not involve these services within the building. No impact would occur.

c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

No Impact. As discussed in Section 6.9(c) through (e), the project would not directly or indirectly alter existing drainage patterns of a site or area because it is a regulatory change affecting design and installation of ventilation systems within the building envelope. Relative to specific sites, plenum return air would not trigger site improvements or any exterior changes that would alter drainage patters. As a result, the project would not directly or indirectly require or result in construction of new stormwater drainage facilities or expansion of existing facilities. No impact would occur.

d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

No Impact. The project is a regulatory change related to plenum return air and flexible ducting within specified areas of OSHPD 3 outpatient clinics. These changes would not directly or indirectly impact water demands compared to the existing ventilation system regulations. The project would not impact existing entitlements and resources and would not require new or expanded entitlements.

e) Result in a determination by the waste water treatment provider, which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

No Impact. The design and installation of plenum return air, as discussed in Section 6.9(b), do not involve or impact wastewater services within a building. Accordingly, the project would not affect the capacity of wastewater treatment providers. No impact would occur.

f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?

No Impact. The project would likely predominantly affect new construction and conversion of existing buildings to clinics. Use of plenum return air would eliminate the need for ducted return air systems. The project would therefore use less material, and accordingly reduce the potential for waste during construction and conversion. CALGreen requires that at least 50% of the nonhazardous construction and demolition waste from nonresidential construction operations be recycled and/or salvaged for reuse. In addition, many local jurisdictions have construction and demolition waste ordinances requiring recycling and/or reuse of

some fraction of construction and demolition waste. Indirect effects related to solid waste are not anticipated to increase, and may decrease slightly, compared to without the project. Thus, the project would not adversely impact landfill capacity.

g) Comply with federal, state, and local statutes and regulations related to solid waste?

No Impact. The proposed regulatory change would not affect requirements to adhere to applicable federal, state, and local statutes and ordinances regarding solid waste. As discussed above, indirect adverse impacts to solid waste are not anticipated with project implementation.

h) Result in inefficient, wasteful, and unnecessary consumption of energy?

No Impact. Energy consumption is not included in the CEQA Guidelines Appendix G checklist. However, Appendix F of the CEQA Guidelines requires a discussion of energy impacts of proposed projects, with particular emphasis on avoiding or reducing inefficient, wasteful, and unnecessary consumption of energy. This question has been included to provide a framework to evaluate comments raised in the 2013 proposed change for plenum air and, specifically, a concern that the allowance for plenum return air in HVAC systems would result in additional thermal loads and more energy demands because of the heat transfer from exterior plenum walls and roofs. The section is organized into a Regulatory Setting, Environmental Setting, and Impact Analysis.

Regulatory Setting

STATE PLANS, POLICIES, REGULATIONS, AND LAWS

Executive Order S-3-05

Executive Order S-3-05, signed June 1, 2005, set the GHG emission reduction targets for California. By 2020, the targets were 1990 emission levels and by 2050 emission targets were set at 80% of 1990 levels.

Global Warming Solutions Act of 2006 (AB 32)

Current guidance and goals for reductions of GHG emissions are embodied in AB 32, passed on August 31, 2006. AB 32 establishes plans and requirements to meet the 2020 tier of emissions reduction targets established in Executive Order S-3-05. AB 32 directed the California Air Resources Board (CARB) to develop a Scoping Plan that lays out California's strategy for meeting the reduction goals. The 2008 Scoping Plan adopted early action measures to reduce GHG emissions and outlined additional reduction measures to meet the 2020 target. CALGreen is one of the measures identified to reduce GHG emissions from buildings. AB 32 also triggered changes to the 2013 update of California Energy Code, which requires minimum energy efficiency in buildings.

Executive Order B-30-15

Executive Order B-30-15, signed on April 29, 2015, establishes a new, post-2020 goal of reducing GHG emissions 40% below 1990 levels by 2030. Currently there are several bills that relate to future GHG targets,

including AB 21, SB 32, and AB 33. It is likely that these bills will be amended to respond to Executive Order B-30-15. By the time California's legislative session concludes in September, there may be a definitive statutory mandate to achieve GHG emissions reduction by 2050, implementing Executive Order B-30-15.

California Energy Action Plan

In 2003, the California Public Utilities Commission, the California Energy Commission, and the California Power Authority adopted an Energy Action Plan that articulated a single, unified approach to meeting California's electricity and natural gas needs. The plan represented the first time the energy agencies had described a common, unified approach to further California's energy policy goals. The plan was updated in 2008 to address California's ongoing actions in the context of global warming. With California's commitment to reducing greenhouse gas emissions as the backdrop, the update examined the following policy areas: energy efficiency, demand response, renewable energy, electricity reliability and infrastructure, electricity market structure, natural gas supply and infrastructure, research and development, and climate change.

California Building Code (CBC) (CCR Title 24, Part 2)

The CBC incorporates by adoption the 2012 International Building Code of the International Code Council with necessary California amendments. The following provision is pertinent to this project:

Chapter 12 - Interior Environment

Section 1226 [OSHPD 3] Clinics.

Section 1226.2 requires all new OSHPD 3 buildings and additions, alterations or repairs to existing buildings, and conversion of space to a clinic use within existing buildings, to comply with applicable provisions of the California Electrical Code, California Mechanical Code, California Plumbing Code, and California Fire Code (Parts 3, 4, 5, and 9 of Title 24).

California Green Building Standards Code (CALGreen) (CCR Title 24, Part 4)

CALGreen was first adopted into the CBSC in 2010 and establishes planning and design standards for sustainable site development, energy efficiency, and water and material conservation. CALGreen was not adopted in its entirety for OSHPD facilities. Appendix A6.1 identifies the voluntary standards for OSHPD 1, 2, and 4 facilities. While there are no mandatory or voluntary measures for OSHPD 3 facilities, the nonresidential (commercial) building classification triggers compliance with CALGreen. The code applies to newly constructed nonresidential buildings, nonresidential building additions of 1,000 square feet or greater, and/or nonresidential building alterations with a permit valuation of $200,000 or above.

Chapter 5 - Nonresidential Mandatory Measures

Section **5.410 Building Maintenance and Operation**

Section 5.410.2 requires new non-residential buildings and non-residential tenant improvements and additions over 10,000 square feet to include building commissioning to verify that building systems and components meet project requirements. The process of commissioning a building is an essential tool for optimizing energy performance. The process ensures that all building systems perform interactively according to the

contract documents, the design intent, and the owner's operational needs. Commissioning is required for HVAC and controls. The code specifies a series of steps and requirements that must be implemented as part of this process.

5.410.4 Testing and Adjusting.

This section requires testing and adjusting systems for all new buildings less than 10,000 square feet or non-residential addition and alterations of 1,000 square feet or greater and/or permit value of $200,000 or above. The systems required for testing include HVAC systems and controls. Section 5.410.4.3.1 requires balancing the HVAC system before a new space-conditioning system serves a building or space is operated for normal use. The system shall be balanced in accordance with the procedure defined by the Testing Adjusting and Balancing Bureau National Standards, the National Environmental Balancing Bureau Procedural Standards, Associated Air Balancing Council National Standards, or as approved by the enforcing agency. The remainder of this section addresses requirements for reporting and provision of operating and maintenance manuals.

California Energy Code (CEC) (CCR Title 24, Part 6)

The code establishes mandatory statewide energy efficiency standards. CBC section 1226.2 excludes application of the CEC for conversions of spaces to OSPHD 3 clinic use within existing buildings. However, these requirements are triggered by building classification and occupancy. OSHPD 3 clinics are typically located in commercial (non-residential) buildings and often classified as Group B. The CEC includes provisions that apply to newly constructed nonresidential buildings as well as additions, alterations, or repairs to nonresidential buildings. Section 100.0 identifies that the CEC applies to all Group B buildings new construction.

Subchapter 2 - All Occupancies – Mandatory Requirements for the Manufacture, Construction, and Installation of Systems, Equipment, and Building Components

Section 110.7 Mandatory Requirements to Limit Air Leakage

This section requires all joints, penetrations and other openings in the building envelope that are potential sources of air leakage to be caulked, gasketed, weather stripped, or otherwise sealed to limit infiltration and exfiltration.

Section 110.8 Mandatory Requirements for Insulation, Roofing Products and Radiant Barriers

Certification of insulation is required to ensure conductive thermal performance is pursuant to the CCR, Title 24, Part 12, Chapter 12-13, Article 3, "Standards for Insulation Material." (These include required R-value and U-factor necessary for determining prescriptive compliance with the standards.)

(e) Insulation Placement on Roof/Ceilings

Insulation installed to limit heat loss and gain through the top of conditioned spaces is subject to several requirements to limit infiltration, exfiltration, and other conditions.

Subchapter 3 - Nonresidential, High-Rise Residential, Hotel/Motel Occupancies, and Covered Processes—Mandatory Requirements

Section 120.4 Requirements for Air Distribution System Ducts and Plenums

This section requires all air distribution system ducts and plenums to be installed, sealed, and insulated in compliance with CMC sections 601.0, 602.0, 603.0, 604.0, 605.0, and HVAC Duct Construction Standards Metal and Flexible 3rd Edition. In addition, insulation should be protected from damage, including from sunlight, moisture, equipment maintenance, and wind.

Section 120.5 Required Nonresidential Mechanical System Acceptance

This section includes requirements for nonresidential mechanical system acceptance. Before an occupancy permit is granted, equipment and systems (such as outdoor air ventilation systems, duct systems, air economizers, demand control ventilation systems, and supply fan variable flow controls) are required to be certified as meeting the Acceptance Requirements for Code Compliance, as specified by the Reference Nonresidential Appendix NA7. These requirements include a construction inspection and functional testing, which must be performed by a HERS rater (see Appendix NA1) to verify that duct leakage conforms to standards.

Subchapter 5 - Nonresidential, Hi-Rise Residential and Hotel/Motel Occupancies—Performance and Prescriptive Compliance Approaches for Achieving Energy Efficiency

Buildings subject to this chapter are required to meet certain mandatory measures—see above and either performance (140.1) or prescriptive compliance (140.2). Section 140.4 includes requirements for space conditioning systems, including power consumption requirements for constant volume fan, variable air volume (VAV), and air treatment or filtering systems. Air economizers are also required under the prescriptive compliance approach for systems meeting a threshold cooling capacity (140.4[c]).

California Mechanical Code (CMC), CCR Title 24, Part 4

A description of code provisions applicable to OSHPD and related to air distribution systems follows.

Chapter 4 - Ventilation Air Supply

407.0 Ventilation System Details [OSHPD 1, 2, 3& 4]

407.5.1 Variable Air Volume Systems (VAV). VAV systems are not allowed for airborne infection isolation rooms, protective environment rooms, or those listed in Table 325.0 as critically sensitive areas. For nonsensitive areas, VAV systems may be considered if they meet specified criteria.

Chapter 6 - Duct Systems

604.0 Insulation of Ducts

604.1 General

This section requires supply-air ducts, return-air ducts, and plenums of a heating or cooling system to be insulated to achieve the minimum thermal (R) value in accordance with SMACNA HVAC Duct Construction Standards: Metal and Flexible [OSHPD 1, 2, 3 & 4]. Cold air ducts shall be insulated wherever necessary or to

prevent condensation. Approved materials shall be installed within ducts and plenums for insulation, sound deadening, or other purposes. Materials shall have a mold, humidity, and erosion-resistant surface.

604.2 [OSHPD 1, 2, 3 (surgical clinics) & 4] Thermal acoustical lining may not be installed in ducts, boxes, sound traps, and other in-duct systems serving specified areas unless terminal filters with 90% average efficiency or MERV 14 are installed downstream of the duct lining.

Environmental Setting

A plenum is a cavity in a building that can provide air circulation for an HVAC system. It is usually the space between the structural ceiling and a drop-down ceiling. Heat transfer is thermal energy in transit due to a spatial temperature difference. Whenever a temperature difference exists in a medium or between media, heat transfer must occur. There are many ways in which a building's interior temperature can be affected, including heat transfer due to climatic effects, air leakage through exterior walls, and porous insulation structure. Thermal load is the amount of heat energy that would need to be added or removed to a space to maintain the temperature.

Impact Analysis

The proposed CMC changes are expected to predominantly apply to new OSHPD 3 facilities provided through new construction and conversion of existing buildings. It is not anticipated that existing outpatient clinics would alter existing systems to incorporate plenum return air unless undergoing alteration or additions. The evaluation of potential energy impacts was based on a review of literature that addresses the differences in energy consumption between HVAC systems with return air plenums and fully ducted air returns.

ENERGY CONSUMPTION PLENUM RETURN VS. DUCTED RETURNS: LITERATURE REVIEW

A thorough literature research found three references that discuss the effect on energy associated with the use of architectural return air plenums versus ducted return air systems. All three studies concluded plenum air return systems use less energy than ducted air return systems in commercial (non-residential) building, as summarized below.

Steven T. Taylor's 'Return Air Systems," article discusses the use of architectural return air plenums.[159] From 1983 to 1997 and 2010 to present, Taylor was/is a member of the committee responsible for ASHRAE Standard 90.1, *Energy Conservation in New Non-Residential Buildings*, a standard that is the basis of energy conservation codes in every state in the country. In the article, Taylor specified that compared to ducted return air, the use of plenum return air reduces fan energy costs by approximately 20 to 30% due to the much lower pressure drop of the plenum return system. Also, the use of plenum return air reduces fan energy in systems with outdoor air economizers due to the ability to use non-powered relief or relief fans in lieu of less efficient return fans, which are generally required when return air is fully ducted. As noted in the Regulatory Setting above, economizers are permissible (and in fact required for certain fan-system sizing under CEC prescriptive requirements), except for certain rooms in OSHPD 3 clinics. Taylor also concluded in the article

[159] Taylor, "Return Air Systems."

that the benefits of using architectural plenums for return air include much lower first costs and lower energy costs. In other words, the use of plenum return air in HVAC systems would require less energy than a fully ducted air return, resulting in a positive impact.

Another report published in 2008 by the National Center for Energy Management and Building Technologies (NCEMBT) surveyed 14 mechanical designers, noting that the literature contains very little information on criteria and practices for return system design.[160] All but two of the designers stated that a system with ducted returns will consume slightly more fan energy than plenum returns due to higher friction losses of return ductwork. Although a plenum return may have a higher heat gain from the ceiling space due to roof heat load and lighting heat gain, designers stated that higher fan energy from ducted returns has more of an impact on energy demand.

One of the documents reviewed in the NCMBT report was a HVAC design guide prepared by Hydeman et al. for the California Energy Commission, "Advanced Variable Air Volume System Design Guide."[161] The design guide is focused on integrated HVAC system design, while achieving cost-effective energy savings, in commercial buildings in California and similar climates. The design guide recommends using return air plenums (versus ducted return air) when possible, because both energy and first costs are reduced. A significant finding of the design guide is that plenum returns offer the advantage of lower energy use because of reduced fan static pressure for plenum returns compared to ducted returns.

In addition, regardless of the proposed CMC changes, which would allow the use of plenum return air in certain areas of OSHPD 3 clinics where fully ducted air return is now required by current code, new building construction needs to comply with CALGreen and the CEC.

The CEC includes requirements that would ensure the efficiency of the HVAC system to be installed. Section 110.2 requires the space-conditioning equipment to be installed only when the manufacturer has certified that the equipment complies with the applicable requirements, including equipment efficiency and low-leakage air-handling units. Also, section 120.4 requires all air distribution system ducts and plenums to be installed, sealed, and insulated in compliance with the CMC. Furthermore, section 140.0 requires duct systems to be sealed to a leakage rate not to exceed 6% of the nominal air handler airflow rate, as confirmed through field verification and diagnostic testing, in accordance with the applicable procedures in Reference Nonresidential Appendices NA1 and NA2. Lastly, section 120.5 requires equipment and systems, including air distribution systems, to be certified as meeting the Acceptance Requirements for compliance, as specified by the Reference Nonresidential Appendix NA7, before an occupancy permit is granted. Therefore, under the California Energy Code, the HVAC systems to be installed in the new OSPHD 3 clinics would consist of code-complying equipment and materials; the duct systems would have been verified through HERS testing to minimize leakage; and the air distribution system would be certified as meeting the Acceptance Requirements.

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160 W. Bahnfleth, D. McWhirter, and D. Novosel, "Impact of Air Return Strategy on Building Energy Consumption and Indoor Air Quality: Literature Review," Report NCEMBT-081010 (Alexandria, VA: National Center for Energy Management and Building Technologies, 2008).

161 M. Hydeman et al., *Advanced Variable Air Volume System Design Guide*, #500-03-082, California Energy Commission.

The California Energy Code also includes requirements on the building that would minimize heat transfer in and out of the building that would affect the thermal load of the OSHPD 3 clinics. Section 110.7 requires all joints, penetrations, and other openings in the building envelope that are potential sources of air leakage to be caulked, gasketed, weather stripped, or otherwise sealed to limit infiltration and exfiltration. Also, section 110.8 requires the insulation installed on roofs/ceilings to limit heat loss and gain through the top of conditioned spaces. By complying with the requirements, heat transfer from the exterior plenum walls and roofs would be minimized and would not cause additional thermal loads resulting in substantial increase in energy demand.

Furthermore, if the OSHPD 3 facility is over 10,000 square feet, section 5.410 of CALGreen and section 120.8 of the California Energy Code both require building commissioning, which would ensure that the system is installed, operated, and maintained according to the codes.

Although conversions of existing buildings to OSHPD 3 clinics would not trigger compliance with CALGreen and CEC, the use of plenum return air would require less energy by HVAC systems than the ones with ducted air return, as established in the literature. Therefore, the proposed CMC changes to allow the use of plenum air would allow HVAC systems to consume less energy than HVAC systems with fully ducted air return, resulting in a positive impact for both new construction and existing buildings that convert to OSHPD 3 outpatient clinics. No adverse impact would occur with the proposed regulatory change.

6.18 MANDATORY FINDINGS OF SIGNIFICANCE

Issues		Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a)	Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?				X
b)	Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)			X	
c)	Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?				X

Comments:

a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below

self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

No Impact. The project would not directly or indirectly reduce the population, range, or habitat of a rare or endangered plant or animal or fish or wildlife species; threaten to eliminate a plant or animal community; or eliminate important examples of the major periods of California history or prehistory. The project is a regulatory change related to plenum return air within certain spaces of OSHPD 3 outpatient clinics. Work pursuant to these changes would occur within the building envelope and would not reasonably be expected to impact biological, cultural, or historical resources. No impact would occur.

b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)

Less Than Significant Impact. Section 15355 of the CEQA Guidelines defines "cumulative impacts" as two or more individual effects that, when considered together, are either considerable or compound other environmental impacts. The individual effects may be changes resulting from a single project or a number of separate projects. The goal of this analysis is to identify reasonably foreseeable projects that could have spatial and temporal overlaps with the proposed project. OSHPD is proposing changes to the California Plumbing Code (CPC) to allow for plastic plumbing pipes (i.e., ABS, PVC, and CPVC) in OSHPD facilities as part of the 2015 triennial code adoption cycle. Section 6.8(i) addresses the potential cumulative impacts of these changes relative to fire hazards. The analysis concludes that the amount of piping material in the plenum with this proposed change is relatively small when compared to other construction materials and furnishings, and the combustion products are not more toxic than other building materials. Therefore, people occupying the OSHPD 3 clinics would not be exposed to increased risk of injury or death from fire from the cumulative code changes, and the impact is considered less than significant.

c) Does the project have environmental effects, which will cause substantial adverse effects on human beings, either directly or indirectly?

Less Than Significant Impact. This Initial Study evaluated the proposed regulatory change with respect to the potential for increased health and safety risks related to indoor air quality and infectious diseases and increased risk of fire spread and sound transmission within the affected building spaces. The findings in this study are that these impacts are less than significant. The project would not have substantial adverse effects on humans, directly or indirectly.

6. Environmental Analysis

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Appendix A Initial Express Terms for Proposed Building Standards of the Office of Statewide Health Planning and Development Regarding Proposed Changes to California Mechanical Code California Code of Regulations, Title 24, Part 4

Appendix

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INITIAL EXPRESS TERMS
FOR
PROPOSED BUILDING STANDARDS
OF THE
OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT

REGARDING PROPOSED CHANGES TO
CALIFORNIA MECHANICAL CODE
CALIFORNIA CODE OF REGULATIONS, TITLE 24, PART 4

LEGEND FOR EXPRESS TERMS
1. Existing California amendments or code language being modified are in italics when they appear in the model code text: All such language appears in *italics*, modified language is underlined.
2. New California amendments: All such language appears *underlined and in italics*.
3. Repealed text: All such language appears in ~~strikeout~~.

INITIAL EXPRESS TERMS

CHAPTER 1
ADMINISTRATION
DIVISION I
CALIFORNIA ADMINISTRATION

Adopt 2015 Uniform Mechanical Code (UMC) and carry forward existing amendments of the 2013 California Mechanical Code (CMC) for OSHPD 1, 2, 3, & 4 with the following modifications:

CHAPTER 1
DIVISION II
ADMINISTRATION

Due to renumbering in the 2015 UMC the existing 2013 CMC OSHPD amendment of Section 101.3 is to be carried forward to Section 102.1:

~~**101.3**~~ **102.1 Conflicts Between Codes.** Where the requirements within the jurisdiction of this mechanical code conflict with the requirements of the plumbing code, the plumbing code shall prevail. In instances … prevail. ***[OSHPD 1, 2, 3 & 4]*** *See Chapter 1, Division I, Section 1.1.7.*

Notation
Authority: Health and Safety Code Sections 1226, 1275, 18928, 129790 and 129850; Government 11152.5
Reference: Health and Safety Code Section 129850

CHAPTER 2
DEFINITIONS

Adopt entire 2015 Uniform Mechanical Code (UMC) chapter and carry forward existing amendments of the 2013 California Mechanical Code (CMC) for OSHPD 1, 2, 3, & 4.

Notation
Authority: Health and Safety Code Sections 1226, 1275, 18928, 129790 and 129850; Government 11152.5
Reference: Health and Safety Code Section 129850

CHAPTER 3

GENERAL REQUIREMENTS

Adopt entire 2015 Uniform Mechanical Code (UMC) chapter and carry forward existing amendments of the 2013 California Mechanical Code (CMC) for OSHPD 1, 2, 3, & 4 with the following modifications:

Due to renumbering in the 2015 UMC the existing 2013 CMC OSHPD amendments of Section 303.3 are to be carried forward to Section to 303.2:

303.~~3~~2 Closet or Alcove Installations. Central heating furnaces and boilers installed in closets or alcoves shall be listed for such installation. Central heating furnaces not listed for closet or alcove installation shall be installed in a room or space having a volume not less than 12 times the total volume of the furnace. Central heating boilers not listed for closet or alcove installation shall be installed in a room or space having a volume 16 times the volume of the boiler. ***[OSHPD 1, 2, 3 & 4]*** *The total volume of the boilers shall be based on the total number of central-heating boilers that can operate at the same* time.

Exceptions~~ :~~
*~~(2)~~ **[OSHPD 1, 2, 3 & 4]** A 25 percent reduction in the boiler room volume is allowed with forced-draft boilers and approved ventilation of the boiler room. In no case shall boiler room volume or clearances be reduced below those required by the conditions of the boiler listing. The boiler and the boiler room ventilation system, including fans, controls, and damper motors shall be on emergency power when required by Section 326.0. The ventilation system shall either operate continuously, or, if interlocked with the boiler(s) it shall not interfere with the proper boiler operation.*

Where the ceiling height of the room or space exceeds 8 feet (2438 mm), the volume shall be calculated on the basis of an 8 foot (2438 mm) height.

The following 2013 CMC OSHPD amended sections are being renumbered to be in line with the renumbering of Chapter 3 of the 2015 UMC:

~~323~~ 318.0 Scope.

~~323~~ 318.1 Applicability. *This part is applicable to health facilities regulated by OSHPD (See Adoption Tables for application for specific sections).*

~~323~~ 318.2 Services/Systems and Utilities. *Refer to Section 1224.4.1 of the California Building Code.*

~~324~~ 319.0 Steam and Hot-Water Systems.

~~324.1~~ 319.1 Requirements for Hospitals and Optional Services Provided in Correctional Treatment Centers. [OSHPD 1 & 4]

~~324.1.1~~ 319.1.1 *Boilers … equipment.*
~~324.1.2~~ 319.1.2 *A minimum … boiler.*
~~324.1.3~~ 319.1.3 *Boiler systems … Region X.*
~~324.1.4~~ 319.1.4 *Boiler feed pumps … requirement.*
~~324.1.5~~ 319.1.5 *At least two sources … that service.*

~~324.2~~ 319.2 Requirements for Skilled Nursing, Intermediate Care Facilities and Basic Services Provided in Correctional Treatment Centers. [For OSHPD 2 & 4]

~~324.2.1~~ 319.2.1 *Boilers, if provided, shall accommodate Section ~~324.1~~ 319.1*
~~324.2.2~~ 319.2.1 *Two or more interconnected water heaters are an acceptable means to provide two sources of heat for hot water (See Section ~~324.1.5~~ 319.1.5).*

~~325.0~~ 320.0 Air Conditioning and Heating Systems.

~~325.1~~ 320.1 Requirements for Hospitals and Optional Services Provided in Correctional Treatment Centers. [OSHPD 1 & 4]

***~~325.1.1~~ 320.1.1** The systems shall be designed to provide the temperatures and relative humidity for sensitive areas or rooms shown in Table ~~325.0~~.320.0 When outdoor humidity and internal moisture sources are not sufficient to meet the requirements of Table ~~325.0~~ 320.0, humidification shall be provided by means of the health-care facility air-handling systems. Temperature shall be individually controlled for each operating and delivery room. Burn unit patient rooms that require humidifiers to comply with Table ~~325.0~~ 320.0 shall be provided with individual humidity control. All humidifiers shall use dry steam. Humidifiers shall be located within air handling systems or ductwork to avoid moisture accumulation in downstream components , including filters and insulation.*

***~~325.1.2~~ 320.1.2** For occupied areas not shown in Table ~~325.0~~ 320.0, heating systems shall be designed to provide 70°F to 75°F (21.1°C to 23.9°C) based on the ~~Median of Extremes shown by the 1982 ASHRAE Climatic Data for Region X and ASHRAE 1994 Supplement to Climatic Data for Region X~~ Climatic Design Data in the most recent version of ASHRAE Handbook-Fundamentals. The systems shall be thermostatically controlled with appropriate zoning to achieve the above conditions.*

***~~325.1.3~~ 320.1.3** For occupied areas not shown in Table ~~325.0~~ 320.0, cooling systems shall be designed to provide 75°F (23.9°C) maximum based on the 0.~~5~~ .4 percent summer design dry bulb temperatures shown by the ~~1982 ASHRAE Climatic Data for Region X and ASHRAE 1994 Supplement to Climatic Data for Region X~~ Climatic Design Data in the most recent version of ASHRAE Handbook-Fundamentals The systems shall be thermostatically controlled with appropriate zoning to achieve the above conditions.*

~~325.2~~ 320.2 Requirements for Skilled Nursing, Intermediate Care Facilities and Basic Services Provided in Correctional Treatment Centers. [For OSHPD 2 & 4]

***~~325.2.1~~ 320.2.1** Systems shall accommodate the provisions of Section ~~325.1.2~~ 320.1.2 through ~~325.1.3~~ 320.1.3.*

~~325.3~~ 320.3 Requirements for Outpatient Facilities and Licensed Clinics. [For OSHPD 3]

***~~325.3.1~~ 320.3.1** The system shall be designed to provide the temperature and humidity's for sensitive areas for rooms shown in Table ~~325.0.~~ 320.0*

TABLE ~~325.0~~ 320.0
HEATING, COOLING, AND RELATIVE HUMIDITY
REQUIREMENTS FOR SENSITIVE AREAS OR ROOMS

Area or Rooms Designation	Temperature Range [1,2]	Relative Humidity [1,3]
	°F	Percent
Operating room	68-75	20-60
Cystoscopy	68-75	20-60
Cardiac catheterization lab	70-75	max 60
Trauma/cardiac room	70-75	20-60
Delivery room, Caesarean operating room	68-75	20-60
Gastrointestinal endoscopy procedure room	68-73	20-60
Post-Anesthesia Care Unit	70-75	~~30~~ 20-60
Newborn nursery	72-78	30-60
Newborn Intensive-care nursery	~~70-75~~ 72-78	30-60

unit		
Intensive care[4]	*70-75*	*30-60*
Burn Unit	*70-75*	*40-60*

1 Thermostats and humidistat shall be either locally resettable and of the non-locking type or remotely resettable and of the locking type.

2 Systems shall be capable of maintaining the rooms within the range during normal operation. Lower or higher temperature shall be permitted when patients' comfort and/or medical conditions require those conditions.

3 The ranges listed are the minimum and maximum limits where control is specifically needed.

4 Types of intensive care service spaces are listed in the California Building Code.

~~326.0~~ 321.0 Essential Mechanical Provisions. [OSHPD 1, 2, 3 (Surgical Clinics only) & 4] *During periods of power outages essential electrical power shall be provided for the following equipment:*

~~326.1~~ 321.1 *(Does not apply to OSHPD 3 surgical clinic.) All heating equipment necessary to maintain a minimum temperature of 60°F (15.6°) in patient areas which are not specified in Table ~~325.0~~ 320.0.*

~~326.2~~ 321.2 *All heating equipment necessary to maintain the minimum temperatures for sensitive areas as specified in Table ~~325.0~~ 320.0.*

~~326.3~~ 321.3 *Equipment necessary for humidification of the areas listed in Table ~~325.0~~*

~~326.4~~ 321.4 *All supply, return, and exhaust fans required to maintain the positive and negative air balances as required in Table 4-A.*

~~326.5~~ 321.5 *All control components and control systems necessary for the normal operation of equipment required to have essential electrical power.*

~~326.6~~ 321.6 *Alarms for airborne infection isolation rooms and protective environment rooms.*

Notation
Authority: Health and Safety Code Sections 1226, 1275, 18928, 129790 and 129850; Government 11152.5
Reference: Health and Safety Code Section 129850

CHAPTER 4
VENTILATION AIR

Adopt the 2015 Uniform Mechanical Code (UMC) and carry forward existing amendments of the 2013 California Mechanical Code (CMC) for OSHPD 1, 2, 3, & 4 with the following modifications:

401.1 Applicability. This chapter contains requirements for ventilation air supply, exhaust, and makeup air requirements for occupiable spaces within a building. ***[OSHPD 1, 2, 3 & 4]*** *See Sections 404.0 through 418.0.*

402.0 Ventilation Air. *[Not permitted for OSHPD 1, 2, 3, and 4]*

403.0 Ventilation Rates. *[Not permitted for OSHPD 1, 2, 3 & 4]*
…

407.4 Air Circulation.

407.4.1 *Design of the ventilation system shall provide air movement that is generally from clean to less clean areas.*

407.4.1.1 *Air supplied to operating rooms, cesarean operating rooms, cardiac catheterization labs, cystoscopy rooms, delivery rooms, and nurseries shall be delivered at or near the ceiling of the area served. In these~~s~~ areas and in morgues and autopsy rooms all air removed from the area shall be removed near floor level. Exhaust or recirculation inlets shall be located not less than 3 inches (76 mm) nor more than 8 inches (203 mm) above the finished floor, except in morgues and autopsy rooms where all of the exhaust air is removed through an autopsy table designed for this purpose. At least two exhaust or recirculation air inlets of equal capacity shall be used in all cardiac catheterization labs, cystoscopy rooms, operating rooms, and delivery rooms and shall be located not less than 3 inches (76 mm) nor more than 8 inches (203 mm) above the finished floor.*

…

407.4.1.4 *No space above a ceiling may be utilized as an outside-air, relief-air, supply-air, exhaust-air, or return-air plenum.*

Exceptions:

(1) Designs specifically approved by the enforcing agency.

(2) Return air plenums shall be permitted for ***[OSHPD 3]*** *provided that spaces listed in Table 4A that have required pressure relationships shall be served by fully ducted supply, return, and exhaust systems. The following additional surgery and critical-care patient-care areas that do not require a pressure relationship shall also be served by fully ducted supply, return, and exhaust systems: (1) Recovery Rooms, and (2) Treatment Rooms.*

In facilities that treat inpatients, mechanical systems shall only utilize fully ducted systems for supply, return, and exhaust air.

…

408.0 Filters. [OSHPD 1, 2, 3 & 4]

…

408.1.5 *Filter bank No. 1 shall be located upstream of the air-conditioning equipment. Filter bank No. 2 and filter bank No. 3 shall be located downstream of the supply fan and all cooling and humidification equipment with efficiencies as indicated in Table 4-B or Table 4-C.*

Exception: *Dry steam-type humidifiers for local room humidity control may be installed in the supply air duct downstream of the final filter bank where designs are specifically approved by the enforcing agency.*

Dry steam is that which is defined in the ASHRAE HVAC Systems and Equipment Handbook.

…

408.2.2 *Noncentral recirculating air systems providing cooling to high heat producing equipment located in nonsensitive areas shall have a filter with 30 percent average efficiency based on ASHRAE 52.2~~-2007~~ or a minimum efficiency reporting value (MERV) of 8 based on ASHRAE 52.2~~-2007~~.*

…

408.2.4 *Noncentral recirculating air handling systems, for example, through-the-wall units, fan coil units, and heat pumps may be utilized for single patient rooms of one or more beds. Filtration for these units shall have a minimum weight arrestance value of 50 percent, based on ASHRAE 52.2~~-2007~~ or a minimum efficiency reporting value (MERV) of 1, based on ASHRAE 52.2~~-2007~~. The air ventilation system providing the minimum air changes of outdoor air shall comply with Table 4-B. These units may be used as recirculating units only. All outdoor air requirements shall be met by a separate central air handling systems.*

…

408.3.3 *Noncentral recirculating air-handling systems, i.e. through the wall units, may be utilized for each patient room with one or more beds. Filtration for these units shall have a minimum weight arrestance value of 50 percent, based on ASHRAE 52.2-~~2007~~ or a minimum efficiency reporting value (MERV) of 1, based on ASHRAE 52.2-~~2007~~. The air ventilation system providing the minimum air changes of outdoor air shall comply with Table 4-C. These units may be used as recirculating units only. All outdoor air requirements shall be met by a separate central air handling system.*

…

411.0 Kitchen and Dining Areas. [OSHPD 1, 2, 3 & 4]

411.1 *The air from dining areas may be used to ventilate the food preparation areas only after it has passed through a filter with at least an 80 percent average efficiency based on ASHRAE 52.2-~~2007~~ or a minimum efficiency reporting value (MERV) of 13, based on ASHRAE 52.2-~~2007~~.*

Exception: *For skilled nursing facilities, intermediate care facilities and correctional treatment centers, the air from dining area may be used to ventilate food preparation areas only after it has passed through a filter with a 50 percent average efficiency based on ASHRAE 52.2-~~2007~~ or a minimum efficiency reporting value (MERV) of 10, based on ASHRAE 52.2-~~2007~~.*

…

414.1.2 *Exhaust shall discharge above roof level and through an accessible HEPA filter. The HEPA filter shall be located upstream of the exhaust fan and have a minimum efficiency of 99.97 percent based on the DOP method in accordance with Mil-Std. 282 or a minimum efficiency reporting value (MERV) of 17, based on ASHRAE 52.2-~~2007~~. Filter gage shall be installed across the filter. For maintenance of air balance relationship, see Section 407.3.2. The 25-foot (7620 mm) dimension required by Section 414.1 may be reduced when a 99.97 percent HEPA filter or a minimum efficiency reporting value (MERV) of 17, based on ASHRAE 52.2-~~2007~~ is used and the reduced dimension is specifically approved by the enforcing agency.*

…

416.0 Alarms – Airborne Infection Isolation Rooms and Protective Environment Rooms. [OSHPD 1, 2, 3 & 4]

416.1 *An alarm system which is based on static pressure control, volumetric control or directional flow … is not being met during closed door conditions:*

(2) When a minimum pressure differential of 0.0~~0~~-1 inch (0.003 kPa) of water and a minimum inward (outward for protective environment rooms) air velocity of 100 feet per minute (0.508 m/s) is not being maintained at the air transfer opening required by Table 4-A.

TABLE 4-A
PRESSURE RELATIONSHIP AND VENTILATION REQUIREMENTS FOR GENERAL ACUTE CARE HOSPITALS, SKILLED NURSING FACILITIES, INTERMEDIATE CARE FACILITIES, CORRECTIONAL TREATMENT CENTERS, OUTPATIENT FACILITIES, AND LICENSED CLINICS

A	B	C	D	E	F
			CONDITIONED AIR NOT 100% O.S.A		
AREA DESIGNATION	AIR BALANCE RELATIONSHIP TO ADJACENT AREAS[8]	MINIMUM AIR CHANGES IF 100% O.S.A.	MINIMUM AIR CHANGES OF OUTDOOR AIR PER HOUR	MINIMUM TOTAL AIR CHANGES PER HOUR	ALL AIR EXHAUSTED DIRECTLY TO OUTDOORS
Operating room, hybrid operating room, cardiac catherization lab and	*P*[7]	*12*	*5*	*20*	—
Electroconvulsive therapy procedure room	*P*	*10*	*3*	*15*	
Semi-restricted corridor	*NR*	*2*	*2*	*4*	—
Patient holding preparation[1]	*NR*	*6*	*2*	*6*	—
Delivery room, cesarean operating room	*P*	*12*	*5*	*20*	—
Newborn/well baby nursery	*P*	*6*	*2*	*6*	—
Recovery/Post anesthesia care unit	*NR*	*6*	*2*	*6*	*Yes*
Intensive care service spaces, acute respiratory - care service spaces, burn service spaces, coronary - care service spaces, pediatric intensive - care service spaces[9]	*P*	*6*	*2*	*6*	—
Newborn intensive care	*P*	*6*	*2*	*6*	—
Emergency department[1]					
Waiting area	*N*	*12*	*2*	*12*	*Yes*[2]
Operating room	*P*	*12*	*5*	*20*	—
Orthopedic/Cast room	*P*	*12*	*5*	*20*	—
Treatment room	*NR*	*6*	*2*	*6*	—
Trauma Room[3]	*P*	*12*	*5*	*20*	—
Observation	*NR*	*2*	*2*	*6*	—
Fast track room	*NR*	*2*	*2*	*6*	—
Triage	*N*	*12*	*2*	*12*	*Yes*
Pre-screening area	*N*	*12*	*2*	*12*	*Yes*[2]
Treatment room, ~~and~~ , examination rooms, Bloodborne infection isolation	*NR*	*6*	*2*	*6*	—
Radiological/Imaging:					
Angiography room	*P*	*12*	*5*	*15*	—
Interventional imaging	*P*	*12*	*5*	*15*	—
Procedure room					

A	B	C	D	E	F
			CONDITIONED AIR NOT 100% O.S.A		
AREA DESIGNATION	AIR BALANCE RELATIONSHIP TO ADJACENT AREAS[8]	MINIMUM AIR CHANGES IF 100% O.S.A.	MINIMUM AIR CHANGES OF OUTDOOR AIR PER HOUR	MINIMUM TOTAL AIR CHANGES PER HOUR	ALL AIR EXHAUSTED DIRECTLY TO OUTDOORS
X-ray (diagnostic and treatment)	*NR*	*6*	*2*	*6*	*—*
CT Scan	*NR*	*6*	*2*	*6*	*—*
MRI room	*NR*	*6*	*2*	*6*	*—*
Fluoroscopy room	*N*	*6*	*2*	*6*	*Yes*
Dark room	*N*	*12*	*2*	*12*	*Yes*
Negative-pressure x-ray room	*N*	*12*	*2*	*12*	*Yes*
Ultra sound room	*NR*	*6*	*2*	*6*	*—*
Gamma camera	*NR*	*6*	*2*	*6*	*—*
Waiting area	*N*	*12*	*2*	*12*	*Yes*
Nuclear Medicine (Gamma, PET, SPECT)	*N*	*6*	*2*	*6*	*Yes*
Dietary day storage	*NR*	*—*	*—*	*2*	*—*
~~*Nuclear medicine*~~	~~*N*~~	~~*6*~~	~~*2*~~	~~*6*~~	~~*Yes*~~
Nuclear medicine hot lab	*N*	*—*	*—*	*6*	*Yes*

…

8 For operating rooms, cardiac catheterization labs, angiography rooms, cystoscopy rooms, delivery rooms, cesarean operating rooms, newborn intensive care, intensive care units, and nurseries provide approximately 15% excess supply air to the room or a sufficient quantity of excess supply air to maintain an appropriate positive air balance based on the room tightness and number of doors. For all rooms not listed in this footnote or not listed in Table ~~325.0~~320.0 requiring either a positive or negative air balance, provide approximately 10% differential cfm between supply and return/exhaust airflow but not less than 25 cfm differential shall be provided regardless of room size. Room function, size, and tightness may be considered when determining the differential airflow required. Where continuous directional control is not required, variations between supply cfm and return or exhaust cfm shall be minimized.

TABLE 4-B
FILTER EFFICIENCIES FOR CENTRAL VENTILATION AND AIR-CONDITIONING SYSTEMS IN GENERAL ACUTE CARE HOSPITALS, ACUTE PSYCHIATRIC HOSPITALS, OUTPATIENT FACILITIES, AND LICENSED CLINICS[1]

AREA DESIGNATION	MINIMUM NUMBER OF FILTER BANKS	FILTER EFFICIENCY % FILTER BANK (MINIMUM EFFICIENCY REPORTING VALUE MERV)[5]		
		NO. 1[1]	NO. 2[1]	NO. 3[1]
Orthopedic operating room, bone marrow transplant operating room, organ transplant operating room	*3*	*30%*	*90%*	*99.97%[3]*
		(8)	*(14)*	*(17)*
Protective environment rooms	*3*	*30%*	*90%*	*99.97%[4]*
		(8)	*(14)*	*(17)*
Angiography; cardiac catheterization labs; operating rooms; Interventional imaging Procedure rooms; delivery rooms nurseries; patient care, treatment, cystoscopy, cesarean operating room, diagnostic, and related areas; airborne infection isolation rooms; areas providing direct patient service or clean supplies such	*2*	*30%*	*90%*	*—*
		(8)	*(14)*	*—*
Laboratories	*2*	*30%*	*80%*	*—*
		(8)	*(13)*	*—*
Administrative, med staff support areas, bulk storage, soiled holding areas, food preparation areas, public cafeterias, and laundries	*1*	*30%*	*—*	*—*
		(8)	*—*	*—*

Notation
Authority: Health and Safety Code Sections 1226, 1275, 18928, 129790 and 129850; Government 11152.5
Reference: Health and Safety Code Section 129850

CHAPTER 5
EXHAUST SYSTEMS

Adopt entire 2015 Uniform Mechanical Code (UMC) chapter and carry forward existing amendments of the 2013 California Mechanical Code (CMC) for OSHPD 1, 2, 3, & 4 with the following modifications:

Due to renumbering in the 2015 UMC the existing 2013 CMC OSHPD amendment of Section 504.1 is to be carried forward to Section to 504.1.1:

504.0 Environmental Air Ducts.

…

~~**504.1**~~ **504.1.1 Backdraft Protection.** Exhaust ducts shall terminate outside the building and shall be equipped with backdraft dampers or with motorized dampers that automatically shut where the systems or spaces served are not in use. ***[OSHPD 1, 2 & 4] Exception:*** *Back-draft dampers are not required when the exhaust fan must operate continuously.*

…

Due to renumbering in the 2015 UMC the existing 2013 CMC OSHPD amendment of Section 508.1.1 is to be carried forward to Section 508.5.

508.0 Hoods.

…

508.5 Supports. Hoods shall be secured in place ***[OSHPD 1, 2 & 4]*** *to resist the lateral loads given in the California Building Code, Title 24, Part 2* by noncombustible supports. The supports shall be capable of supporting the expected weight of the hood and plus 800 pounds (362.9 kg).

Notation
Authority: Health and Safety Code Sections 1226, 1275, 18928, 129790 and 129850; Government 11152.5
Reference: Health and Safety Code Section 129850

CHAPTER 6
DUCT SYSTEMS

Adopt entire 2015 Uniform Mechanical Code (UMC) chapter and carry forward existing amendments of the 2013 California Mechanical Code (CMC) for OSHPD 1, 2, 3, & 4 with the following modifications:

602.0 Material.

602.1 General. Supply air, return air, and outside air for heating, cooling, or evaporative cooling duct systems constructed of metal shall comply with SMACNA HVAC Duct Construction Standards–Metal and Flexible or UL 181.

Not permitted for [OSHPD 1, 2, ~~3~~ & 4] Concealed building spaces or independent construction within buildings shall be permitted to be used as ducts or plenums.

…

Due to renumbering in the 2015 UMC the existing 2013 CMC OSHPD amendment of Section 602.3.1 is to be carried forward to Section 602.6.1.

603.4 Factory-Made Air Ducts and Connectors. Factory-made air ducts and connectors shall be listed …

603.4.1 Length Limitation. Factory-made flexible air ducts and connectors shall be not more than 5 feet (1524 mm) in length and shall not be used in lieu of rigid elbows or fittings.

603.4.2 Flexible Ducts. [OSHPD 1, 2, 3 & 4] *In hospital building projects and all other health-care facilities, including clinics and correctional treatment centers, flexible ducts of not more than 10 feet (3048 mm) in length may be used to connect supply, return or exhaust-air terminal devices to rigid duct systems. Where constant volume, variable volume or mixing boxes are utilized, flexible duct of not more than 10 feet (3048 mm), may be used on the inlet side for alignment. An internal impervious liner shall be provided to isolate insulation material from conditioned air.*

Due to the formatting of 2015 UMC the existing 2013 CMC OSHPD amendments of Section 604.0 are to be carried forward and located within the Section 604.0 as follows:

604.0 Insulation of Ducts.

604.1 General. Air ducts conveying air at temperatures exceeding 140°F (60°C) shall be insulated to maintain an insulation surface temperature of not more than 140°F (60°C). Factory-made air ducts and insulations intended for installation on the exterior of ducts shall be legibly printed with the name of the manufacturer, the thermal resistance (R) value at installed thickness, flame-spread index and smoke developed index of the composite material. Internal duct liners and insulation shall be installed in accordance with SMACNA HVAC Duct Construction Standards–Metal and Flexible. ***[OSHPD 1, 2, 3 & 4]*** *Cold air ducts shall be insulated wherever necessary or to prevent condensation.*

…

604.1.2 Duct Coverings and Linings. Insulation applied to the surface of ducts, including duct coverings, linings, tapes, and adhesives, located in buildings shall have a flame-spread index not to exceed 25 and a smoke developed index not to exceed 50, where tested in accordance with ASTM E84 or UL 723. The specimen preparation and mounting procedures of ASTM E2231 shall be used. Air duct coverings and linings shall not flame, glow, smolder, or smoke where tested in accordance with ASTM C411 at the temperature to which they are exposed in service. In no case shall the test temperature be less than 250°F (121°C). Coverings shall not penetrate a fire-resistance-rated assembly.

604.2 [OSHPD 1, 2, 3 (surgical clinics) & 4] *Thermal acoustical lining materials shall not be installed within ducts, terminal boxes, sound traps, and other in-duct systems serving areas such as operating, cesarean operating rooms, delivery rooms, post anesthesia care units, cystoscopy, cardiac cath labs, nurseries, intensive care units, newborn intensive care units, and airborne infection Isolation rooms unless terminal filters with 90 percent average efficiency based on ASHRAE Standard 52.2 or minimum efficiency rating value (MERV) of 14 are installed downstream of the duct lining.*

604.3 [OSHPD 1, 2 & 4] *Thermal or acoustical lining materials shall not be installed within ducts which are downstream of the 99.97 percent high-efficiency particulate air (HEPA) filter or with minimum efficiency rating value (MERV) of 17 required in Section 408.2.1 for protective environment rooms.*

Notation
Authority: Health and Safety Code Sections 1226, 1275, 18928, 129790 and 129850; Government 11152.5
Reference: Health and Safety Code Section 129850

CHAPTER 7
COMBUSTION AIR

Adopt entire 2015 Uniform Mechanical Code (UMC) chapter for OSHPD 1, 2, 3 & 4.

Notation
Authority: Health and Safety Code Sections 1226, 1275, 18928, 129790 and 129850; Government 11152.5
Reference: Health and Safety Code Section 129850

CHAPTER 8
CHIMNEYS AND VENTS

Adopt entire 2015 Uniform Mechanical Code (UMC) chapter for OSHPD 1, 2, 3 & 4.

Notation
Authority: Health and Safety Code Sections 1226, 1275, 18928, 129790 and 129850; Government 11152.5
Reference: Health and Safety Code Section 129850

CHAPTER 9
INSTALLATION OF SPECIFIC APPLIANCES

Adopt entire 2015 Uniform Mechanical Code (UMC) chapter and carry forward existing amendments of the 2013 California Mechanical Code (CMC) for OSHPD 1, 2, 3, & 4 with the following modifications:

Due to renumbering in the 2015 UMC the existing 2013 CMC OSHPD amendment of Section 907.1 is to be carried forward to Section 911.1.

~~**907.1**~~ **911.1 Prohibited Installations.** Decorative appliances for installation in vented fireplaces shall not be installed in bath-rooms or bedrooms unless the appliance is listed and the bed-room or bathroom has the required volume in accordance with Section 701.4. [NFPA 54:10.6.1]

[OSHPD 1, 2 & 4] *A vented decorative appliance shall not be located in any hospital, skilled nursing facility, intermediate care facility, or correctional treatment center.*

Notation
Authority: Health and Safety Code Sections 1226, 1275, 18928, 129790 and 129850; Government 11152.5
Reference: Health and Safety Code Section 129850

CHAPTER 10
BOILERS AND PRESSURE VESSELS

Adopt entire 2015 Uniform Mechanical Code (UMC) chapter for OSHPD 1, 2, 3 & 4.

Notation
Authority: Health and Safety Code Sections 1226, 1275, 18928, 129790 and 129850; Government 11152.5
Reference: Health and Safety Code Section 129850

CHAPTER 11
REFRIGERATION

Adopt entire 2015 Uniform Mechanical Code (UMC) chapter and carry forward existing amendments of the 2013 California Mechanical Code (CMC) for OSHPD 1, 2, 3, & 4 with the following modifications:

TABLE ~~1105.1~~ 1104.1
PERMISSIBLE REFRIGERATION SYSTEMS[1]

Notation
Authority: Health and Safety Code Sections 1226, 1275, 18928, 129790 and 129850; Government 11152.5
Reference: Health and Safety Code Section 129850

CHAPTER 12
HYDRONICS

Adopt entire 2015 Uniform Mechanical Code (UMC) chapter and carry forward existing amendments of the 2013 California Mechanical Code (CMC) for OSHPD 1, 2, 3, & 4 with the following modifications:

Due to the formatting in the 2015 UMC the existing 2013 CMC OSHPD amendment of Section 1201.3.7 is to be carried forward to Section 1210.2.

1210.0 Materials.
…

1210.2 Expansion and Contraction. Pipe and tubing shall be so installed that it will not be subject to undue strains or stresses, and provisions shall be made for expansion, contraction, and structural settlement. ***[OSHPD 1, 2 & 4]*** *Pipe connections less than 2-1⁄2" to heating coils, cooling coils, humidifiers, and similar equipment shall have flexible connectors or three (3) 90-degree offsets in close proximity of the connection.*

Notation
Authority: Health and Safety Code Sections 1226, 1275, 18928, 129790 and 129850; Government 11152.5
Reference: Health and Safety Code Section 129850

CHAPTER 13
FUEL GAS PIPING

Adopt entire 2015 Uniform Mechanical Code (UMC) chapter for OSHPD 1, 2, 3 & 4.

Notation
Authority: Health and Safety Code Sections 1226, 1275, 18928, 129790 and 129850; Government 11152.5
Reference: Health and Safety Code Section 129850

CHAPTER 14
PROCESS PIPING

Adopt entire 2015 Uniform Mechanical Code (UMC) chapter for OSHPD 1, 2, 3 & 4.

Notation
Authority: Health and Safety Code Sections 1226, 1275, 18928, 129790 and 129850; Government 11152.5
Reference: Health and Safety Code Section 129850

CHAPTER 15
SOLAR SYSTEMS

Entire Chapter not adopted by OSHPD.

CHAPTER 16
STATIONARY POWER PLANTS

Entire Chapter not adopted by OSHPD.

CHAPTER 17
REFERENCED STANDARDS

Adopt entire 2015 Uniform Mechanical Code (UMC) chapter and carry forward existing amendments of the 2013 California Mechanical Code (CMC) for OSHPD 1, 2, 3, & 4.

Notation
Authority: Health and Safety Code Sections 1226, 1275, 18928, 129790 and 129850; Government 11152.5
Reference: Health and Safety Code Section 129850

Appendix B California Mechanical Code Table 4-A and Table 4-B

Appendix

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APPENDIX B
California Mechanical Code Table 4-A and Table 4-B

Table 4-A Pressure Relationship and Ventilation Requirement for General Acute Care Hospitals, Skilled Nursing Facilities, Intermediate Care Facilities, Correctional Treatment Centers/Outpatient Facilities, and Licensed Clinics

A	B	C	D	E	F
Area Designation	**Air Balance Relationship to Adjacent Areas[8]**	**Minimum Air Changes if 100% O.S.A.**	Conditioned Air not 100% O.S.A.		**All Air Exhausted Directly to Outdoors**
			Minimum Air Changes of Outdoor Air Per Hour	Minimum Total Air Changes Per Hour	
Operation room, cardiac catherization lab and cystoscopy	P[7]	12	5	20	—
Patient holding preparation[1]	NR	6	2	6	—
Delivery room, cesarean operation room	P	12	5	20	—
Newborn/well baby nursery	P	6	2	6	—
Post anesthesia care unit	NR	6	2	6	Yes
Intensive care service spaces, acute respiratory – care service spaces, burn service spaces, coronary – care service spaces, pediatric intensive – care service spaces[9]	P	6	2	6	—
Emergency department:[1]					
Waiting area	N	12	2	12	Yes[2]
Operating room	P	12	5	20	—
Treatment room	NR	6	2	6	—
Trauma room[3]	P	12	5	20	—
Triage	N	12	2	12	Yes
Patient room	NR	2	2	6	—
Dialysis treatment room	NR	6	2	6	—
Dialyzer reprocessing room	N	—	—	10	Yes
IV Prep. Room	P	6	2	6	—
Blood drawn/phlebotomy	NR	6	2	6	—
Infusion room	P	6	2	6	—
Blood bank/tissue storage	NR	6	2	6	—
Administrative	NR	2	2	4	—
Patient area corridor	NR	2	2	4	—
Labor/delivery/recovery room	NR	2	2	6	—
Labor/delivery/recovery/postpartum room					
Airborne infection isolation room	N[4]	12	2	12	Yes
Airborne infection isolation anteroom	P[4]	10	2	10	Yes
Protective environment room	P[5]	15	2	15	—
Protective environment anteroom	N[6]	15	2	15	—
Treatment and examination rooms, Bloodborne infection isolation room	NR	6	2	6	—
Bronchoscopy and endoscopy	N	12	2	12	Yes
Special purpose room (SNF & ICF only)	NR	6	2	6	Yes
Radiological/Imaging:					
Angiography room	P	12	5	15	—
X-ray (Diagnostic and treatment)	NR	6	2	6	—
CT scan	NR	6	2	6	—
MRI room	NR	6	2	6	—
Fluoroscopy room	N	6	2	6	Yes

APPENDIX B
California Mechanical Code Table 4-A and Table 4-B

Table 4-A Pressure Relationship and Ventilation Requirement for General Acute Care Hospitals, Skilled Nursing Facilities, Intermediate Care Facilities, Correctional Treatment Centers/Outpatient Facilities, and Licensed Clinics

A	B	C	D	E	F
Area Designation	**Air Balance Relationship to Adjacent Areas[8]**	**Minimum Air Changes if 100% O.S.A.**	Conditioned Air not 100% O.S.A.		**All Air Exhausted Directly to Outdoors**
			Minimum Air Changes of Outdoor Air Per Hour	Minimum Total Air Changes Per Hour	
Dark room	N	12	2	12	Yes
Negative-pressure x-ray room	N	12	2	12	Yes
Ultra sound room	NR	6	2	6	—
Gamma camera	NR	6	2	6	—
Waiting area	N	12	2	12	Yes
Nuclear medicine	N	6	2	6	Yes
Bedpan room	N	—	—	10	Yes
Bathroom	N	—	—	10	Yes
Janitor's closet, housekeeping room	N	—	—	10	Yes
Sterilizer equipment room	N	—	—	10	Yes
Sub sterile room	NR	10	2	10	Yes
Linen and trash chute rooms	N	—	—	10	Yes
Food preparation centers	NR	10	2	10	Yes
Dining room	NR	10	2	10	—
Dishwashing room	N	—	—	10	Yes
Dietary day storage	NR	—	—	2	—
Laundry, general (clean and dirty)	NR	10	2	10	Yes
Soiled linen sorting and storage	N	—	—	10	Yes
Clean linen storage	P	2	2	2	—
Anesthesia storage	NR	8	—	8	Yes
Central medical and surgical supply:					
Soiled or decontamination room	N	4	2	4	Yes
Clean workroom	P	4	2	4	—
Unsterile supple	NR	2	2	2	—
Pharmacy/medicine room	P	2	2	4	—
Laboratory:					—
General	N	6	2	—	—
Biochemistry	P	6	2	—	—
Cytology	N	6	2	6	Yes
Glass washing	N	10	2	10	Yes
Histology	N	6	2	6	Yes
Microbiology	N	6	2	6	Yes
Pathology	N	6	2	6	Yes
Serology	P	6	2	6	—
Sterilizing	N	10	2	10	Yes
Media transfer	P	4	2	4	—
Infectious disease and virus	N	6	2	6	Yes
Bacteriology	N	6	2	6	Yes
Nuclear medicine	N	6	2	6	Yes
Nuclear Medicine hot lab	N	—	—	6	Yes

APPENDIX B
California Mechanical Code Table 4-A and Table 4-B

Table 4-A Pressure Relationship and Ventilation Requirement for General Acute Care Hospitals, Skilled Nursing Facilities, Intermediate Care Facilities, Correctional Treatment Centers/Outpatient Facilities, and Licensed Clinics

A	B	C	D	E	F
Area Designation	**Air Balance Relationship to Adjacent Areas[8]**	**Minimum Air Changes if 100% O.S.A.**	Conditioned Air not 100% O.S.A.		**All Air Exhausted Directly to Outdoors**
			Minimum Air Changes of Outdoor Air Per Hour	Minimum Total Air Changes Per Hour	
Airborne infection isolation Treatment/exam room	N	12	2	12	Yes
Physical therapy and hydrotherapy	N	6	2	6	—
Soiled workroom (utility room)	N	4	2	10	Yes
Clean workroom	P	4	2	6	—
Autopsy	N	12	2	12	Yes
Toilet room	N	—	—	10	Yes
Shower room	N	—	—	10	Yes
Waiting area primary care clinic	N	10	2	10	Yes[2]
Staff sleep rooms	NR	2	2	4	—
Morgues and autopsy rooms	N	10	2	10	Yes
Pediatric play area	NR	6	2	6	—
Recreation/activity room	NR	6	2	6	—
Multipurpose room	NR	6	2	6	—
Lactation	NR	2	2	6	—
Observation/seclusion room	NR	2	2	6	—
Occupational therapy	NR	6	2	6	—
Endoscope cleaning/processing	N	10	2	10	Yes

P= Positive NR= No requirement for continuous directional control N=Negative

1 The pressure relationship of the entire emergency department shall be negative to other adjacent areas.

2 Air may be recirculated if a high-efficiency particulate air (HEPA) filter with a minimum efficiency of 99.97 percent or a minimum efficiency reporting value (MERV) of 17 is installed in the return air duct which serves the waiting area.

3 The term “trauma room” as used here is the operating room space in the emergency department or other trauma reception area that is used for emergency surgery. The first air room and/pr “emergency room” used for initial treatment of accident victims may be ventilated as noted for the “treatment rooms”.

4 The anteroom shall have positive air pressure in relation to the airborne infection isolation room. A door louver, transfer grille, or other acceptable means shall be provided to allow for airflow from the anteroom to the airborne infection isolation room. The airborne isolation room shall have negative pressure in relation to the anteroom, and the adjoining toilet room shall have negative pressure in relation to the airborne infection isolation room. Negative pressure shall be achieved by balancing the exhaust cfm to no less than 75 cfm (35.4 L/s) greater than the supply cfm for each airborne infection isolation room the anteroom serves. The overall area consisting of the anteroom, airborne infection isolation room, and adjoining toilet room shall have an equal air balance in relation to the corridor.

Exception: For correctional treatment centers, the location and design of the air transfer device shall not compromise the safety, security and protection of staff, inmates and property.

5 Positive-pressure shall be achieved by balancing the supply cfm to not less 75 cfm (35.4 L/s) greater than the exhaust and return cfm for each protective environment room the anteroom serves.

6 The anteroom shall have negative air pressure in relation to the protective environment room. A door louver, transfer grille, or other acceptable means shall be provided to allow for airflow from the protective environment room to the anteroom. The protective environment room shall have positive-pressure in relation to the anteroom and adjoining toilet room. Positive pressure shall be achieved by balancing the supply cfm to not less than 75 cfm (35.4 L/s) greater than the exhaust and return cfm. The overall area consisting of the anteroom, protective environment room, and adjoining toilet room shall have an equal air balance in relation to the corridor.

Exception: for correctional treatment centers, the location and design of the air transfer device shall not compromise the safety, security and protection of staff, inmates and property.

7 Cystoscopy may have no requirement for continuous directional control when approved by Authority Having Jurisdiction.

8 For operating rooms, cardiac catheterization labs, angiography rooms, cystoscopy rooms, delivery rooms, cesarean operating rooms, newborn intensive care, intensive care units, and nurseries provide approximately 15% excess supply air to the room or a sufficient quantity of excess supply air to maintain an appropriate positive air balance based on the room tightness and number of doors. For all rooms not listed in this footnote or not listed in Table 325.0 requiring either a positive or negative air balance, provided approximately 10% differential cfm between supply and return/exhaust airflow but not less than 25 cfm differential shall be provided regardless or room size. Room function, size, and tightness may be considered when determining the differential airflow required. Where continuous directional control is not required, variations between supply cfm and return or exhaust cfm shall be minimized.

9 Intensive care patient rooms that contain a modular toilet/sink combination until within the room shall be provided with a minimum of 75 cfm of exhaust directly over the modular toilet/sink combination unit.

APPENDIX B
California Mechanical Code Table 4-A and Table 4-B

Table 4-B Filter Efficiencies for Central Ventilation and Air-Conditioning Systems in General Acute Care Hospitals, Acute Psychiatric Hospitals, Outpatient Facilities, and Licensed Clinics[1]

Area Designation	Minimum Number of Filter Banks	Filter Efficiency % Filter Bank (Minimum Efficiency Reporting Value (MERV)[5]		
		No. 1[1]	No. 2[1]	No. 3[1]
Orthopedic operating room, bone marrow transplant operating room, organ transplant operating room	3	30%	90%	99.97%
		(8)	(14)	(17)
Protective environment rooms	3	30%	90%	99.97%
		(8)	(14)	(17)
Angiography; cardiac catheterization labs; operating rooms: delivery rooms nurseries; patient care, treatment, cystoscopy, cesarean operating room, diagnostic, and related areas; airborne infection isolation rooms; areas providing direct patient service or clean supplies such as sterile and clean processes	2	30%	90%	---
		(8)	(14)	---
Laboratories	2	30%	90%	---
		(8)	(14)	---
Administrative, med staff support areas, bulk storage, soiled handling areas, food preparation areas, public cafeterias, and laundries	1	30%	---	---
		(8)	---	---

1 Based on ASHRAE 52.2-2007.
2 Based on DOP test in accordance wit MIL-STD-282 or based on ASHRAE 52.2-2007.
3 HEPA filters at air outlet or other locations when approved by the Authority Having Jurisdiction.
4 HEPA filter location in the supply duct which serves the positive-pressure isolation room or rooms may serve more than one supply outlet and more than one positive-pressure isolation room. HEPA filter or a filter with minimum efficiency reporting value (MERV) of 17 installation shall be designed and equipped to permit safe removal, disposal, and replacement of filters.
5 The numbers in parentheses represent MERV rating based on ASHRAE 52.2-2007.

Appendix C Rationale for Elimination of Certain ATD in Initial Study Evaluation

Appendix

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APPENDIX C

Rationale for Elimination of Certain ATD in Initial Study Evaluation

For the purpose of this Initial Study (IS), the universe of potential aerosol-transmitted diseases (ATD) was evaluated and narrowed to those pertinent to the proposed code change allowing for plenum return air in certain spaces of OSHPD outpatient clinics. The universe of ATD was initially derived from the California Code of Regulations (CCR) Title 8, Section 5199, Appendix A, Aerosol Transmissible Diseases/Pathogens. In 2009, the California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA), issued this standard to mitigate occupational exposures to pathogens transmitted via aerosols and droplets.

Appendix A of the standard is a list of diseases and pathogens considered aerosol transmissible. The list is divided in two categories: 1) pathogens or diseases requiring airborne infection isolation, and 2) pathogens or diseases requiring droplet precautions. The Cal/OSHA distinction between diseases/pathogens requiring airborne isolation control versus droplet precautions was cross-referenced with the information in Appendix A, Type and Duration of Precautions Recommended for Selected Infections and Conditions, of the US Centers for Disease Control's (CDC's) *2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings*. The CDC list classifies diseases by droplet and airborne transmission.

Although Middle East Respiratory Syndrome (MERS) is not on either the Cal/OSHA or CDC list, it was added to the universe of diseases evaluated because it is a viral respiratory disease first discovered in humans in 2012, after the Cal/OSHA and CDC lists were developed.

Next, based on a variety of information sources , the diseases were evaluated for reasonably foreseeable risk of transmission through ventilation systems in OSHPD 3 clinics. A three-point evaluation was used:

- Whether the disease is transmitted person-to-person and thereby presents a risk for spread in clinics.
- Whether the disease was characterized by droplet transmission (versus airborne transmission), because organisms transmitted via the droplet route do not remain infective over long distances and do not require special air handling and ventilation requirements.
- Whether any cases have been reported in recent years, defined as at least one reported infection in the U.S. in the last decade.

Based on these factors, a sub-set of airborne infectious diseases was selected for detailed evaluation of the risk of transmission through ventilation systems in OSHPD 3 clinics. The three identified as foreseeable risks are chicken pox, measles, and tuberculosis. In addition, although the degree to which airborne transmission contributes to influenza infection is uncertain and has not been adequately studied, it is included as a potential airborne disease in this discussion due to its high incidence rate in the general population. Thus, influenza was also carried forward for detailed assessment in the Initial Study. Further, as discussed in the Initial Study, infectious agents from environmental sources (i.e., Aspergillosis and Legionnaires' disease) that present a risk of transmission through the ventilation systems in outpatient clinics are evaluated in terms of potential health impacts.

Table C-1, *List and Rationale for ATD Eliminated from Initial Study Evaluation,* identifies the factor(s) by which a disease or pathogen was determined not to be a concern with respect to transmission via a ventilation system. Also provided is summary information about the mechanism(s) of disease transmission, incidence of the disease, and the links to information sources consulted. The reader is encouraged to follow the addressees provided for more detailed information.

Table C-1 List and Rationale for ATD Eliminated from Initial Study Evaluation

Diseases/Pathogen	Not transmitted person-to-person	Droplet transmission	No airborne infection cases in U.S. in recent years	Explanation	Source
Anthrax	X			A person could become infected with anthrax from: 1) skin contact with tissues from infected animals; 2) eating meat from an animal with anthrax; 3) inhaling anthrax spores; and 4) non-natural exposures such as in a laboratory or by malicious release (bioterrorism).	California Department of Public Health (CDPH). 2012, October. Anthrax Fact Sheet. http://www.cdph.ca.gov/HealthInfo/discond/Documents/Anthrax.pdf.
			X	The last case of inhalational anthrax in the United States, before bioattacks in 2001, was in 1976 in California. A home craftsman, who worked with yarn, died. *Bacillus anthracis*, the bacteria that causes Anthrax, was isolated from some of the imported yarns used by the patient.	Ohio Department of Health (ODH). 2005, June 7. Anthrax Public Awareness. http://www.odh.ohio.gov/slides/dpslides/pubaware/sld006.htm.
Avian Influenza	X			The spread of avian influenza A viruses from one ill person to another has been reported very rarely, and has been limited, inefficient, and not sustained.	Centers for Disease Control and Prevention (CDC). 2015, March 20. Avian Influenza A Virus Infections in Humans. http://www.cdc.gov/flu/avianflu/avian-in-humans.htm.
			X	Although avian influenza A viruses usually do not infect humans, rare cases of human infection with avian influenza A viruses have been reported. Most human infections with avian influenza A viruses have occurred following direct contact with infected poultry. More than 700 human infections with Asian-origin H5N1 viruses have been reported to WHO from primarily 15 countries in Asia, Africa, the Pacific, Europe and the Near East since November 2003. Highly pathogenic avian influenza A (H5N1) viruses have never been detected among wild birds, domestic poultry, or people in the United States.	Centers for Disease Control and Prevention (CDC). 2015, March 30, 2015. Prevention and Treatment of Avian Influenza A Viruses in People http://www.cdc.gov/flu/avianflu/prevention.htm

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Diseases/Pathogen	Not transmitted person-to-person	Droplet transmission	No airborne infection cases in U.S. in recent years	Explanation	Source
Common cold (rhinovirus)		X		Rhinovirus spreads by droplets and hand-to-hand contact. Colds most often spread when droplets of fluid that contain a cold virus are transferred by touch. These droplets may also be inhaled.	Mayo Clinic. 2015, April 21. Diseases and Conditions: Common Cold: Causes. http://www.mayoclinic.org/diseases-conditions/common-cold/basics/causes/con-20019062. American Lung Association (ALA). 2015, April 21. Facts About the Common Cold. http://www.lung.org/lung-disease/influenza/in-depth-resources/facts-about-the-common-cold.html.
Diptheria		X		Diphtheria is transmitted from person-to-person, usually through respiratory droplets, from coughing or sneezing. Rarely, spreading may occur from skin lesions or clothes that are contaminated with discharges from lesions of an infected person.	Centers for Disease Control and Prevention (CDC). 2013, May 13. Diptheria: Causes and Transmission. http://www.cdc.gov/diphtheria/about/causes-transmission.html. California Department of Public Health (CDPH). 2014, April. Respiratory Diphtheria: Public Health Recommendations. http://www.cdph.ca.gov/HealthInfo/discond/Documents/CDPHDiphtheriaQuicksheet.pdf.
			X	Only five diphtheria cases have been reported in the United States since 2000.	Centers for Disease Control and Prevention (CDC). 2012, May. Epidemiology and Prevention of Vaccine-Preventable Diseases. Chapter 6: Diptheria. http://www.cdc.gov/vaccines/pubs/pinkbook/dip.html.

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Diseases/Pathogen	Not transmitted person-to-person	Droplet transmission	No airborne infection cases in U.S. in recent years	Explanation	Source
Ebola[1]		X		Ebola is transmitted through direct contact with body fluids (blood, diarrhea, sweat, vomit, urine, semen, breast milk) from someone who is sick with Ebola in the mouth, nose, eyes or through a break in the skin. That can happen by being splashed with droplets or through other direct contact, like touching infectious body fluids.	Centers for Disease Control and Prevention (CDC). 2015, February 24. How Ebola is Spread. http://www.cdc.gov/vhf/ebola/pdf/infections-spread-by-air-or-droplets.pdf. Centers for Disease Control and Prevention (CDC). 2015, April 24. Ebola: Transmission. http://www.cdc.gov/vhf/ebola/transmission/.
			X	No confirmed cases have been identified in California.	California Department of Public Health (CDPH). 2015, April 13. Ebola Virus Information Page. http://www.cdph.ca.gov/programs/cder/Pages/Ebola.aspx.
Epiglottitis (*Haemophilus influenzae* type b)		X		*Haemophilus influenzae* bacteria, including *Haemophilus influenzae* type b (Hib), are spread person-to-person by direct contact or through respiratory droplets like by coughing and sneezing. The primary mode of Hib transmission is presumably by respiratory droplet spread, although firm evidence for this mechanism is lacking. Most of the time, *Haemophilus influenzae* bacteria are spread by people who have the bacteria in their noses and throats but who are not ill (asymptomatic).	Centers for Disease Control and Prevention (CDC). 2014, April 2. Haemophilus influenzae Disease (Including Hib): Causes and Transmission. http://www.cdc.gov/hi-disease/about/causes-transmission.html. Centers for Disease Control and Prevention (CDC). 2012, May. The Pink Book: Chapter 7: Haemophilus influenzae type b (Hib). http://www.cdc.gov/vaccines/pubs/pinkbook/hib.html.

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Diseases/Pathogen	Not transmitted person-to-person	Droplet transmission	No airborne infection cases in U.S. in recent years	Explanation	Source
Meningitis/ Meningococcal disease		X		The primary transmission mode of meningitis is by respiratory droplet spread or by direct contact.	Centers for Disease Control and Prevention (CDC). 2012, May. Pink Book: Chapter 13: Meningococcal Disease. http://www.cdc.gov/vaccines/pubs/pinkbook/downloads/mening.pdf.
		X		*Neisseria meningitidis* bacteria, the causative agent of meningitis/meningococcal disease, are spread through the exchange of respiratory and throat secretions like saliva or mucus (e.g., by living in close quarters, kissing). The bacteria are not spread by casual contact or by simply breathing the air where a person with meningococcal disease has been.	Centers for Disease Control and Prevention (CDC). 2015, April 21. Meningococcal Disease: Causes and Transmission. http://www.cdc.gov/meningococcal/about/causes-transmission.html.
Middle East Respiratory Syndrome (MERS)		X		MERS is spread through close person-to-person contact. As of June 2015 WHO (June 2015) recommends droplet precautions. MERS-CoV is the acronym for Middle East Respiratory Syndrome Coronavirus, the virus that causes MERS. MERS-CoV has spread from ill people to others through close contact, such as caring for or living with an infected person. Infected people have spread MERS-CoV to others in health care settings, such as hospitals. All reported cases have been linked to countries in and near the Arabian Peninsula. Most infected people either lived in the Arabian Peninsula or recently traveled from the Arabian Peninsula before they became ill. Cases recently reported (May, 2015) in Korea (and from Korea to China) also are linked to travel to the Middle East. Because it spreads very poorly between people, MERS-CoV can be controlled by public-health measures, which South Korean authorities are now pursuing	Centers for Disease Control and Prevention (CDC). 2014, May 16. Middle East Respiratory Syndrome (MERS): Transmission. http://www.cdc.gov/coronavirus/mers/about/transmission.html. World Health Organization (WHO). 2015, April 8. Frequently Asked Questions on Middle East Respiratory Syndrome Coronavirus (MERS-CoV). http://www.who.int/csr/disease/coronavirus_infections/faq/en/. World Health Organization (WHO). 2015, June 2. Middle East respiratory syndrome coronavirus (MERS-CoV) in the Republic of Korea. http://www.who.int/mediacentre/news/situation-assessments/2-june-2015-south-korea/en/ . Nature. 2015, June 5. South Korean MERS outbreak is not a global threat. http://www.nature.com/news/south-korean-mers-outbreak-is-not-a-global-threat-1.17709

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Diseases/Pathogen	Not transmitted person-to-person	Droplet transmission	No airborne infection cases in U.S. in recent years	Explanation	Source
				aggressively. WHO recommends that droplet precautions be added to standard measures when providing care to patients with symptoms of acute respiratory infection. It is not yet definitively understood exactly how some people have become infected with MERS-CoV. In some communities, people have become ill but no potential source of infection has been found. It is possible that these persons were infected by exposure to an animal or perhaps another source or person.	
Monkeypox		X		The virus that causes monkeypox is thought to be transmitted by large respiratory droplets during direct and prolonged face-to-face contact. In addition, monkeypox can be spread by direct contact with body fluids of an infected person or with virus-contaminated objects, such as bedding or clothing. People also can get monkeypox from an infected animal through a bite or direct contact with the infected animal's blood, body fluids, or lesions. While the disease can be spread from person-to-person, it is much less infectious than smallpox. To date in the United States there has been no evidence of person-to-person transmission of monkeypox. Extrapolating from smallpox, for which airborne transmission has been clearly described, airborne transmission of monkeypox virus cannot be excluded, especially in patients presenting with cough. Transmission of monkeypox within hospitals has been described, albeit rarely. CDC recommends both airborne and droplet precautions.	Centers for Disease Control and Prevention (CDC). 2008, September 5. Fact Sheet: Basic Information About Monkeypox. http://www.cdc.gov/ncidod/monkeypox/factsheet.htm. Centers for Disease Control and Prevention (CDC). 2008, September 5. Updated Interim Infection Control and Exposure Management Guidance in the Health-Care and Community Setting for Patients with Possible Monkeypox Virus Infection. http://www.cdc.gov/ncidod/monkeypox/infectioncontrol.htm.

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Diseases/Pathogen	Not transmitted person-to-person	Droplet transmission	No airborne infection cases in U.S. in recent years	Explanation	Source
Mumps		X		Mumps is spread by droplets of saliva or mucus from the mouth, nose, or throat of an infected person, usually when the person coughs, sneezes, or talks. In addition, the virus may spread when someone with mumps touches items or surfaces without washing their hands and someone else then touches the same surface and rubs their mouth or nose.	Centers for Disease Control and Prevention (CDC). 2010, March 6. Transmission of Mumps. http://www.cdc.gov/mumps/about/transmission.html .
Parvovirus B19		X		Parvovirus B19 spreads through respiratory secretions (such as saliva, sputum, or nasal mucus) when an infected person coughs or sneezes. Parvovirus B19 can also spread through blood or blood products. A pregnant woman who is infected with parvovirus B19 can pass the virus to her baby.	Centers for Disease Control and Prevention (CDC). 2012, February 14. Parvovirus B19 and Fifth Disease. http://www.cdc.gov/parvovirusB19/fifth-disease.html.
Pertussis (whooping cough)		X		Pertussis is a very contagious disease only found in humans and is spread from person-to-person. People with pertussis usually spread the disease by coughing or sneezing while in close contact with others, who then breathe in the pertussis bacteria. Pertussis (whooping cough) can cause serious illness in infants, children, and adults. Pertussis is caused by the bacterium *Bordetella pertussis*. These bacteria attach to the cilia lining part of the upper respiratory system. The bacteria release toxins, which damage the cilia and cause inflammation.	Centers for Disease Control and Prevention (CDC). Pertussis; Causes and Transmission. 2014, September 4 2014..http://www.cdc.gov/pertussis/about/causes-transmission.html California Department of Public Health. Pertussis: Public Health Investigation, July 2014. http://www.cdph.ca.gov/healthinfo/discond/documents/cdph_pertussis_quicksheet.pdf.

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Diseases/Pathogen	Not transmitted person-to-person	Droplet transmission	No airborne infection cases in U.S. in recent years	Explanation	Source
Pneumonic plague		X	X	When a person with plague pneumonia coughs droplets containing the plague bacteria into air, and these bacteria-containing droplets are breathed in by another person, the exposed individual can be infected with pneumonic plague. Typically this requires direct and close contact with the person with pneumonic plague. Transmission of these droplets is the only way that plague can spread between people. This type of spread has not been documented in the United States since 1924, but still occurs with some frequency in developing countries. Cats are particularly susceptible to plague, and can be infected by eating infected rodents. Sick cats pose a risk of transmitting infectious plague droplets to their owners or to veterinarians. Several cases of human plague have occurred in the United States in recent decades as a result of contact with infected cats. Plague can also be spread through flea bites and through contact with contaminated fluid or tissue from an infected animal.	Centers for Disease Control and Prevention (CDC). 2012, June 13. Plague: Ecology and Transmission. http://www.cdc.gov/plague/transmission/.

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Diseases/Pathogen	Not transmitted person-to-person	Droplet transmission	No airborne infection cases in U.S. in recent years	Explanation	Source
Pneumonia		X		Streptococcus pneumoniae (S. pnuemoniae) is a bacterial pathogen that causes pneumonia and other pneumococcal diseases including: ear infections, sinus infections, meningitis (infection of the covering around the brain and spinal cord), and bacteremia (blood stream infection). Transmission of S. pnuemoniae occurs as the result of direct person-to-person contact via respiratory droplets and by autoinoculation in persons carrying the bacteria in their upper respiratory tract. Pneumococcal infections are more common during the winter and in early spring when respiratory diseases are more prevalent.	Centers for Disease Control and Prevention (CDC). 2014, February 7. Pneumonia: Causes and Transmission. http://www.cdc.gov/pneumonia/atypical/mycoplasma/about/causes-transmission.html.
		X		*Mycoplasma pneumoniae (M. pneumonia)* is a bacterium (the singular form of bacteria) that causes community-acquired pneumonia (also referred to as "walking pneumonia").*M. pneumoniae* is transmitted from person-to-person through airborne droplets. People who are sick with *M. pneumoniae* infection usually spread the disease by coughing or sneezing while in close contact with others, who then breathe in the bacteria. *M. pneumoniae* infection is not considered very contagious.	Centers for Disease Control and Prevention (CDC). 2014, February 7. Pneumonia: Causes and Transmission. http://www.cdc.gov/pneumonia/atypical/mycoplasma/about/causes-transmission.html.
Rubella			X	Endemic rubella virus transmission was reported eliminated in the U.S. in 2004. 3 cases of congenital rubella syndrome were reported in the U.S. in 2012.	Centers for Disease Control and Prevention (CDC). 2012, September. Manual for the Surveillance of Vaccine-Preventable Diseases. Chapter 14: Rubella. http://www.cdc.gov/vaccines/pubs/surv-manual/chpt14-rubella.pdf. Centers for Disease Control and Prevention (CDC). 2013, March 29. Morbidity and Mortality Weekly Report (MMWR). Three Cases of Congenital Rubella Syndrome in the Postelimination Era — Maryland, Alabama, and Illinois, 2012.

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Diseases/Pathogen	Not transmitted person-to-person	Droplet transmission	No airborne infection cases in U.S. in recent years	Explanation	Source
					http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6212a3.htm.
Severe Acute Respiratory Syndrome (SARS)		X		Transmission of SARS is mainly by droplet; airborne spread is not a major transmission route but cannot be ruled out. CDPH recommends airborne precautions; CDC recommends both airborne and droplet precautions.	California Department of Public Health (CDPH). 2012, May 9. Infection Control of Aerosol Transmissible Diseases. http://www.cdph.ca.gov/programs/cder/Documents/Infection%20Control%20of%20Aerosol%20Transmissible%20Diseases.ppt. Centers for Disease Control and Prevention (CDC). 2014, January 13. 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf.
			X	No new infections anywhere in the world have been reported since 2004 (CDC 2014). 29 SARS cases had been reported in California as of October 1, 2003, consisting of 22 suspect cases, 5 probable cases, and 2 confirmed cases (CDC 2003).	Centers for Disease Control and Prevention (CDC). 2003, October 2. Severe Acute Respiratory Syndrome (SARS) Report of Cases in the United States. http://www.cdc.gov/media/presskits/sars/cases.htm. Centers for Disease Control and Prevention (CDC). 2014, January 13. 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf.

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Diseases/Pathogen	Not transmitted person-to-person	Droplet transmission	No airborne infection cases in U.S. in recent years	Explanation	Source
Streptococcal pharyngitis (strep throat)		X		Group A *Streptococcus* bacteria (called "group A strep") are spread through contact with droplets after an infected person coughs or sneezes. A person who touches their mouth, nose, or eyes after touching something that has these droplets on it may become ill. It is also possible to get strep throat from contact with sores from group A strep skin infections. Group A strep bacteria can also live in a person's nose and throat without causing illness.	Pitaro, Maria, MD. 2004. "Streptococcal Pharyngitis (Strep Throat)." In T*he Health Care of Homeless Persons: A Manual of Communicable Diseases & Common Problems in Shelters & on the Streets.* Boston: Boston Health Care for the Homeless Program. http://www.bhchp.org/BHCHP%20Manual/pdf_files/Part1_PDF/Strep.pdf. Centers for Disease Control and Prevention (CDC). 2014, October 20. Is It Strep Throat? http://www.cdc.gov/Features/strepthroat/ .

[1] Ebola is one of several viral hemorrhagic fevers identified on the Cal/OSHA and CDC lists. It is isolated because of the recent outbreak in Africa. Of the other types of viral hemorrhagic fevers listed (Marburg, Lassa, and Crimean-Congo), only one (Marburg) has been reported in the US (a US traveler contracted Marburg while in Uganda in 2008).