CAP-AND-TRADE REGULATION

APPENDIX O

Functional Equivalent Document

prepared for the

California Cap on GHG Emissions and Market-Based Compliance Mechanisms

California Air Resources Board

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Table of Contents

ES. EXECUTIVE SUMMARY 1

A. Overview of the Cap-and-Trade Regulation FED 1

B. Environmental Review Process 3

C. Summary of Project Objectives 3

D. Summary of Project Description and Alternatives 6
1. General Overview of Proposed Cap-and-Trade Program 6
2. Project Alternatives 12

E. Summary of Environmental Impacts and Mitigation 14
1. Compliance Responses and Offset Protocols 14
2. Aesthetics 14
3. Agricultural and Forest Resources 15
4. Air Quality 15
5. Biological Resources 16
6. Cultural Resources 17
7. Energy Demand 17
8. Geology, Soils, and Mineral Resources 17
9. Greenhouse Gases 18
10. Hazards and Hazardous Materials 18
11. Hydrology and Water Quality 19
12. Land Use and Planning 19
13. Noise 20
14. Employment, Population and Housing 20
15. Public Services 21
16. Recreation 21
17. Transportation and Traffic 21
18. Utilities and Service Systems 22

F. Areas of Controversy and Issues to be Resolved 22
1. Air Quality and the Potential for Localized Impacts 22
2. Forest Project Offsets 23
3. Issues to be Resolved 24

1.0 INTRODUCTION AND BACKGROUND 25

A. Introduction 25

B. ARB's Certified Regulatory Program Under CEQA 25

C. FED Structure and Organization 26

D. Scope of Analysis and Assumptions 26
1. Adverse Environmental Impacts 26
2. Beneficial Effects 27

E. Incorporation of Documents by Reference 28
1. ARB-Prepared Documents 28
2. Other Incorporated Documents 30

F. Summary of Project Alternatives 30
1. Do Not Implement the Cap-and-Trade Program ("No Project" Alternative) 30
2. Alternatives to Specific Cap-and-Trade Program Design Features Alternative 31
3. Implement Only Additional Source-Specific Command-and-Control Regulations Alternative 32
4. Carbon Fee Alternative 32
5. Cap-and-Trade Linked with a Federal Cap-and-Trade Program 32

2.0 PROJECT DESCRIPTION 33

A. Project Location 33

B. Project Background 33

C. Project Objectives 35

D. Cap-and-Trade Regulation Overview 37
1. Cap-and-Trade 38
2. Fundamental Elements of the Cap-and-Trade Program 38

E. ARB Implementation Approach 43
1. Introduction 43
2. What is Adaptive Management? 44
3. What are the Essential Elements of Adaptive Management? 45
4. Adaptive Management Focus Areas 45
5. Additional Monitoring Areas 47

F. Covered Entities Overview 51
1. Cement Production 52
2. Cogeneration (Combined Heat and Power) 55
3. Glass Production 56
4. Hydrogen Production 58
5. Iron and Steel Manufacturing 59
6. Lime Manufacturing 61
7. Nitric Acid Production 62
8. Oil and Natural Gas Systems 64
9. Petroleum Refining 66
10. Pulp and Paper Manufacturing 68
11. Electricity Self-Generation 69
12. Stationary Combustion 71
13. First Deliverers of Electricity 72
14. Suppliers of Natural Gas 73
15. Suppliers of Transportation Fuels (Petroleum Products) 74
16. Deliverers of Natural Gas Liquids 75

17. Suppliers of Carbon Dioxide 76

G. Offset Program Overview 77
1. Synopsis of the Compliance Offset Protocol for U.S. Ozone Depleting Substances Projects 78
2. Synopsis of the Compliance Offset Protocol for Urban Forest Projects 80
3. Synopsis of the Compliance Offset Protocol for Livestock Projects 81
4. Synopsis of the Compliance Offset Protocol for Forest Projects 83

3.0 ENVIRONMENTAL SETTING 87

A. Aesthetics 87

B. Agriculture and Forest Resources 87
1. Agriculture 87
2. Forest Resources 88

C. Air Quality 89
1. California's Criteria Pollutant and Toxics Regulatory Program 89
2. Stationary Source Regulatory Framework 90
3. Air Toxics Programs 95
4. Clean Vehicle and Diesel Risk Reduction Programs 96
5. Emissions 100
6. Air Quality 101

D. Biological Resources 104

E. Cultural Resources 106

F. Energy Demand 108

G. Geology, Soils, and Minerals 109
1. Soils 109
2. Geology 109
3. Mineral Resources 110

H. Greenhouse Gases 111

I. Hazards and Hazardous Materials 111

J. Hydrology, Water Quality, and Supply 112

K. Land Use and Planning 114

L. Noise 115
1. Acoustic Fundamentals 115
2. Noise Descriptors 116
3. Effects of Noise on Humans 117
4. Vibration 118
5. Existing Sources and Sensitive Land Uses 119

M. Employment, Population, and Housing 120

N. Public Services 121
1. Law Enforcement 121
2. Fire Protection and Emergency Medical Response Services 121
3. Schools 122

O. Recreation 122

P. Transportation and Traffic 123

Q. Utilities and Service Systems 123
1. Water Supply and Distribution 123
2. Wastewater Collection and Treatment 124
3. Electricity and Natural Gas 125
4. Solid Waste Collection and Disposal 125

4.0 IMPACT ANALYSIS 127

A. Introduction 127
1. Scope of Analysis 128
2. Basis for Analysis and Significance Determinations 129
3. Indirect Impacts 138
4. Approach to Evaluation of Localized Impacts 139

B. Covered Entity Compliance Responses 141
1. Compliance Response Descriptions 141
2. Aesthetics 145
3. Agriculture and Forest Resources 147
4. Air Quality 148
5. Biological Resources 173
6. Cultural Resources 176
7. Energy Demand 179
8. Geology, Soils, and Minerals 181
9. Greenhouse Gases 183
10. Hazards and Hazardous Materials 185
11. Hydrology and Water Quality 188
12. Land Use and Planning 190
13. Noise 192
14. Employment, Population, and Housing 194
15. Public Services 195
16. Recreation 197
17. Transportation and Traffic 198
18. Utilities and Service Systems 199
19. Indirect Impacts 201
20. Summary of Impacts and Mitigation Measures 202

C. Compliance Offset Protocol for U.S. Ozone Depleting Substances Projects 215
1. Protocol Description and Compliance Responses 215

2. Aesthetics 217
3. Agriculture and Forest Resources 218
4. Air Quality 218
5. Biological Resources 220
6. Cultural Resources 221
7. Energy Demand 221
8. Geology, Soils, and Minerals 221
9. Greenhouse Gases 222
10. Hazards and Hazardous Materials 222
11. Hydrology and Water Quality 223
12. Land Use and Planning 224
13. Noise 224
14. Employment, Population, and Housing 225
15. Public Services 225
16. Recreation 226
17. Transportation and Traffic 226
18. Utilities and Service Systems 227
19. Indirect Impacts of the Protocol 227
20. Summary of Impacts and Mitigation Measures 227

D. Compliance Offset Protocol for Livestock (Digester) Projects 235
1. Protocol Description and Compliance Responses 235
2. Aesthetics 238
3. Agriculture and Forest Resources 238
4. Air Quality 239
5. Biological Resources 242
6. Cultural Resources 243
7. Energy Demand 246
8. Geology, Soils, and Minerals 247
9. Greenhouse Gases 248
10. Hazards and Hazardous Materials 248
11. Hydrology and Water Quality 250
12. Land Use and Planning 251
13. Noise 252
14. Employment, Population, and Housing 256
15. Public Services 256
16. Recreation 256
17. Transportation and Traffic 257
18. Utilities and Service Systems 259
19. Indirect Impacts 260
20. Summary of Impacts and Mitigation Measures 260

E. Compliance Offset Protocol for Urban Forest Projects 271
1. Protocol Description and Compliance Responses 271
2. Aesthetics 273
3. Agriculture and Forest Resources 273
4. Air Quality 274

5. Biological Resources 276
6. Cultural Resources 277
7. Energy Demand 280
8. Geology, Soils, and Minerals 280
9. Greenhouse Gases 281
10. Hazards and Hazardous Materials 282
11. Hydrology and Water Quality 283
12. Land Use and Planning 284
13. Noise 284
14. Employment, Population, and Housing 285
15. Public Services 286
16. Recreation 286
17. Transportation and Traffic 287
18. Utilities and Service Systems 288
19. Indirect Impacts of the Protocol 288
20. Summary of Impacts and Mitigation Measures 288

F. Compliance Offset Protocol for Forest Projects 299
1. Forest Offset Protocol Description and Compliance Responses 299
2. Aesthetics 308
3. Agriculture and Forest Resources 309
4. Air Quality 310
5. Biological Resources 311
6. Cultural Resources 314
7. Energy Demand 316
8. Geology, Soils, and Minerals 316
9. Greenhouse Gases 318
10. Hazards and Hazardous Materials 319
11. Hydrology and Water Quality 320
12. Land Use and Planning 322
13. Noise 324
14. Employment, Population, and Housing 327
15. Public Services 328
16. Recreation 329
17. Transportation and Traffic 330
18. Utilities and Service Systems 331
19. Indirect Impacts of the Protocol 331
20. Summary of Impacts and Mitigation Measures 332

5.0 CUMULATIVE AND GROWTH-INDUCING IMPACTS 339

A. Introduction 339

B. Cumulative Impacts 341
1. Significance Determinations and Mitigation 341
2. Cumulative Impacts by Resource Area 341

C. Growth-Inducing Impacts 363

6.0 ALTERNATIVES ANALYSIS 365

A. No Project Alternative (No. 1) 371
1. Description of the No Project Alternative 371
2. Impact Discussion 372

B. Alternatives to Specific Cap-and-Trade Program Design Features Alternative 377
1. Border Adjustments (No. 2) 377
2. 100 Percent Auction of Allowances (No. 3) 379
3. Different Offset Limit (No. 4) 382
4. Other Program Design Options (No. 5) 385
5. Not Linking to Other Cap-and-Trade Programs (No. 6) 386

C. Implement Only Additional Source-Specific Command-and-Control Regulations Alternative (No. 7) 387
1. Description of the Implement Only Additional Source-Specific Command-and-Control Regulations Alternative 387
2. Impact Discussion 389

D. Carbon Fee Alternative (No. 8) 390
1. Description of the Carbon Fee Alternative 390
2. Impact Discussion 391

E. Cap-and-Trade Linked with a Federal Cap-and-Trade Program Alternative 393

F. Comparison of Alternatives 393

7.0 MANDATORY FINDINGS OF SIGNIFICANCE 397

A. Mandatory Findings of Significance 397
1. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat for 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? 397
2. Does the project have impacts that are individually limited, but cumulatively considerable? 399
3. Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly? 400

B. Significant and Unavoidable Environmental Effects 400
1. Covered Entity Compliance Responses 400

2. Compliance Offset Protocol for Ozone Depleting Substances Projects ... 401
3. Compliance Offset Protocol for Livestock (Digesters) Projects ... 401
4. Compliance Offset Protocol for Urban Forest Projects ... 401
5. Compliance Offset Protocol for Forest Offset Projects ... 402

C. Significant and Irreversible Environmental Changes ... 402

D. Relationship Between Short-Term Use of the Environment and the Maintenance of Long-Term Productivity ... 402

8.0 REFERENCES ... 405

9.0 LIST OF PREPARERS ... 418

10.0 APPENDICES ... 420

A. Regulatory Framework ... 420
1. Aesthetics Regulatory Setting ... 420
2. Agricultural Resources Regulatory Setting ... 423
3. Air Quality Regulatory Setting ... 425
4. Biological Resources Regulatory Setting ... 429
5. Cultural Resources Regulatory Setting ... 434
6. Energy Regulatory Setting ... 438
7. Geology Regulatory Setting ... 447
8. Hydrology Regulatory Setting ... 451
9. Land Use Regulatory Setting ... 457
10. Noise Regulatory Setting ... 469
11. Population and Housing Regulatory Setting ... 473
12. Transportation Regulatory Setting ... 475
13. Utilities Regulatory Setting ... 476
14. Transport of Hazardous Materials ... 481

B. Environmental Justice ... 484
1. Procedural Inequity ... 485
2. Geographical Inequity ... 485

11.0 LIST OF FIGURES ... 487

12.0 LIST OF TABLES ... 489

13.0 ACRONYMS AND ABBREVIATIONS ... 491

ES. EXECUTIVE SUMMARY

A. Overview of the Cap-and-Trade Regulation FED

This Functional Equivalent Document (FED) is prepared in accordance with the California Environmental Quality Act (CEQA) and serves as the environmental document for the Initial Statement of Reasons (ISOR) for Proposed Rulemaking required by the California Administrative Procedure Act. The California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms (California cap-and-trade program) is designed to reduce emissions of greenhouse gases (GHG) by setting a declining cap on allowed emissions and employing market mechanisms to achieve emission reductions.

The legislature passed and the Governor signed the California Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32, Nunez, Statutes of 2006, chapter 488) establishing California's leadership role in climate change mitigation policy. It directed the California Air Resources Board (ARB) to begin developing discrete early actions to reduce GHG emissions, while also preparing a Climate Change Scoping Plan (Scoping Plan) to identify how best to reach the 2020 limit. The reduction measures to meet the 2020 target are to become operative by 2012. The Scoping Plan provides California's blueprint for reducing GHG emissions to 1990 levels by 2020 as directed by AB 32. The pathway laid out in the Scoping Plan to achieve our long-term climate goals builds on a strong foundation of previous action in California to address climate change and broader environmental issues. The Scoping Plan lays out a mix of measures to achieve the AB 32 goals, including direct regulations, performance-based standards, and market-based mechanisms. Many of the measures in the Scoping Plan complement and reinforce each other. The Scoping Plan measures are designed to reduce GHG emissions by increasing the efficiency with which California uses all forms of energy and by reducing its dependence on the fossil fuels that produce GHGs. The Scoping Plan provides a framework for achieving the goals of AB 32 in a cost-effective manner by relying on a wide range of approaches:

- Expanding and strengthening existing energy-efficiency programs as well as the standards that apply to buildings and appliances;
- Achieving a statewide renewable-energy contribution of 33 percent;
- Establishing targets for transportation-related GHG emissions for regions throughout California, and pursuing policies and incentives to achieve those targets;
- Adopting and implementing measures that were already in progress, including California's clean-car standards, goods movement measures, and the Low Carbon Fuel Standard (LCFS); and

- Developing a California cap-and-trade program that can link with other Western Climate Initiative (WCI) partner programs to create a regional market system.

This FED addresses the potential environmental impacts of California's cap-and-trade regulation and program implementation. The cap-and-trade program is also referred to as the cap-and-trade "regulation" in this document.

The proposed project entails a regulatory approach used to control pollution by setting a declining cap on allowed emissions while employing market mechanisms to achieve emission reductions. An overall 2020 targeted limit of 334.2 million metric tons (MMT) of carbon dioxide equivalent (CO_2e) on GHG emissions from most of the California economy – the "capped sectors" – would be established by the cap-and-trade program. In the cap-and-trade program, a limit, or *cap* is put on the amount of pollutants (i.e., GHGs) that can be emitted. Each GHG has a unique potential to trap heat in the atmosphere. For standardization, GHG emissions are expressed in units called carbon dioxide equivalent, denoted as CO_2e. The cap is implemented by creating allowances in a number equal to the cumulative emissions from all the covered sectors. Each allowance provides a limited authorization to emit one metric ton (MT) of CO_2e. These allowances may be auctioned, distributed for free, or allocated by some combination thereof. Sources in the capped sectors must report their emissions and must surrender allowances to match those emissions in accordance with the schedule in the regulation. The program uses three-year compliance periods. In addition, the regulation includes an annual partial surrender requirement. Covered sources can meet part of their surrender obligation by submitting "offset credits" in place of allowances. Each offset credit represents one $MTCO_2e$ of emissions reduction or removal from sources that are not in capped sectors. The use of offset credits would allow emissions in the capped sectors as a whole to slightly exceed the total number of allowances issued. As used in this document, the term *compliance instrument* includes both allowances and offset credits. After initial distribution of allowances or issuance of offset credits, compliance instruments may be traded among entities in covered sectors and others who elect to participate in the market.

Within the capped sources, some of the reductions toward the cap would be accomplished through direct regulations, such as improved building efficiency standards and vehicle efficiency measures. Together, direct regulation and the cap-and-trade regulation assure that emissions are cost-effectively reduced to the level of the overall cap. The cap-and-trade approach offers key advantages in achieving emissions reduction goals. First, it gives facility owners, electricity deliverers, and fuel deliverers more flexibility to determine the most cost-effective way to meet emissions reduction targets than a traditional regulatory approach. Second, it encourages the development of innovative technologies that could reduce emissions at lower costs than control measures.

B. Environmental Review Process

An environmental review is the process of evaluating potential environmental impacts of a proposed project, feasible mitigation measures for significant environmental impacts, and alternatives to a proposed project to inform decision-makers when they are considering an action on the project.

ARB has drafted this FED for the cap-and-trade regulation in accordance with CEQA and its certified regulatory program implementing CEQA. The FED provides an analysis of the degree to which the proposed cap-and-trade program implementation would affect the physical environment. This FED includes the substantive features of an environmental impact report (EIR). ARB has used the Environmental Checklist criteria as a basis for assessing the potential significant adverse environmental impacts associated with adoption and implementation of the cap-and-trade regulation. The FED includes an analysis of potential adverse environmental impacts, an analysis of alternatives, an analysis of cumulative impacts, and identification of potentially feasible mitigation measures.

A 45-day public review period is provided for the draft FED, followed by a hearing before the Air Resources Board (ARB or "Board"), at which the opportunity for public comment will also be provided (See Cal. Code Regs., tit. 17, §§ 60005, 60007). In accordance with ARB's certified regulatory program, all significant environmental concerns raised by the public during this comment period or at the Board hearing, will be responded to in writing and considered prior to final action by the ARB Executive Officer (See Cal. Code Regs., tit. 17, § 60007). The written responses to comments will be included in the Final Statement of Reasons. A notice of final action and the written responses shall be filed with the Secretary of the Natural Resources Agency for public inspection.

C. Summary of Project Objectives

Recognizing the requirements of AB 32 and the role of the cap-and-trade regulations in contributing to GHG emission reductions, the following project objectives are presented for the proposed cap-and-trade program:

1. ***Achieve technologically feasible and cost-effective aggregate reductions*** – to achieve the maximum technologically feasible and cost-effective reductions in GHG emissions in the aggregate from sources or categories of sources under the cap, in furtherance of achieving the statewide GHG emissions limit (Health & Saf. Code, § 38562, subd. (a) and (c);

2. ***Distribute allowances equitably*** -- to design, to the extent feasible, the distribution of emissions allowances in a manner that is equitable and seeks to minimize costs and maximize the total benefits to California, and encourages early action to reduce GHG emissions (Health & Saf. Code, § 38562, subd. (b)(1));

3. ***Avoid disproportionate impacts*** -- to ensure, to the extent feasible, that activities undertaken to comply with the regulations do not disproportionately impact low-income communities (Health & Saf. Code, § 38562, subd. (b)(2));

4. ***Credit early action*** -- to ensure, to the extent feasible, that entities that have voluntarily reduced their GHG emissions prior to the implementation of this regulation receive appropriate credit for early voluntary actions (Health & Saf. Code, § 38562, subd. (b)(3));

5. ***Complement existing air standards*** -- to ensure, to the extent feasible, that activities undertaken pursuant to the regulations complement, and do not interfere with, efforts to achieve and maintain national and California AAQS and to reduce TAC emissions (Health & Saf. Code, § 38562, subd. (b)(4));

6. ***Be cost-effective*** – to consider the cost-effectiveness of these regulations (Health & Saf. Code, § 38562, subd. (b)(5));

7. ***Consider a broad range of public benefits*** -- to consider overall societal benefits, including reductions in other air pollutants, diversification of energy sources, and other benefits to the economy, environment, and public health (Health & Saf. Code, § 38562, subd. (b)(6));

8. ***Minimize administrative burden*** – to minimize, to the extent feasible, the administrative burden of implementing and complying with the regulation (Health & Saf. Code, § 38562, subd. (b)(7));

9. ***Minimize leakage*** -- to minimize, to the extent feasible, leakage of emissions to states and countries without a mandatory GHG emission cap (Health & Saf. Code, § 38562, subd. (b)(8));

10. ***Weigh relative emissions*** -- to consider, to the extent feasible, the contribution of each source or category of sources to statewide emissions of GHGs (Health & Saf. Code, § 38562, subd. (b)(9));

11. ***Achieve real emission reductions*** – to ensure that GHG emission reductions achieved through a market- based compliance mechanism are real, permanent, quantifiable, verifiable and enforceable by the state board (Health & Saf. Code, § 38562, subd. (d)(1));

12. ***Achieve reductions over existing regulation*** – to ensure that the reductions from a market-based compliance mechanism are in addition to any GHG emissions reduction otherwise required by law or regulation, and any other GHG emissions reduction that would otherwise occur (Health & Saf. Code, § 38562, subd. (d)(2));

13. ***Complement direct measures*** – to ensure, if applicable, that the GHG emissions reduction from a market-based compliance mechanism occurs over the same time period and is equivalent in amount to any direct emissions reduction required pursuant to AB 32 (Health & Saf. Code, § 38562, subd. (d)(3));

14. ***Consider emissions impacts*** -- to consider, to the extent feasible, the potential for direct, indirect, and cumulative emissions impacts from a market-based compliance mechanism, including localized impacts in communities that are already adversely impacted by air pollution (Health & Saf. Code, § 38570, subd. (b)(1));

15. ***Prevent increases in other emissions*** -- to design, to the extent feasible, any market-based compliance mechanism to prevent any increase in the emissions of criteria air pollutants or toxic air contaminants (TACs) (Health & Saf. Code, § 38570, subd. (b)(2));

16. ***Maximize co-benefits*** -- to maximize, to the extent feasible, additional environmental and economic benefits for California, as appropriate (Health & Saf. Code, § 38570, subd. (b)(3)); and

17. ***Avoid duplication*** – to ensure that electricity and natural gas providers are not required to meet duplicative or inconsistent regulatory requirements (Health & Saf. Code, §§ 38501(g), 38561(a)).

The following additional project objectives are included in the Scoping Plan:

18. ***Establish declining cap*** – to establish a declining cap covering 85% of the state's GHG emissions in furtherance of California's mandate to reduce GHG emissions to 1990 levels by 2020;

19. ***Reduce fossil fuel use*** – to reduce California's reliance on fossil fuels and diversify energy sources while maintaining electric system reliability;

20. ***Link with partners*** – to link with other WCI partner programs to create a regional market system;

21. ***Design enforceable, amendable program*** – to design a program that is enforceable and that is capable of being monitored and verified; and

22. ***Ensure emissions reductions*** – to ensure that emissions reductions are real, permanent, quantifiable, verifiable and enforceable.

D. Summary of Project Description and Alternatives

1. General Overview of Proposed Cap-and-Trade Program

Under AB 32, California must reduce greenhouse gas (GHG) emissions to 1990 levels by 2020. Cap-and-trade is one of the key measures that California will employ to reduce emissions and drive long-term investment in cleaner and more efficient technologies to power the state's economy. As proposed here, the cap-and-trade program would establish a firm cap covering about 85 percent of the State's GHG emissions and allow trading of allowances to ensure cost-effective emissions reductions.

The cap-and-trade program will cover the major sources of GHG emissions in the state, including refineries and power plants, industrial facilities and transportation fuels. The program will impose an enforceable emissions cap beginning in 2012 that will steadily decline over time. The State will distribute allowances, which are tradable permits, equal to the cap. Sources under the cap will need to turn in allowances equal to their emissions at the end of each compliance period. Sources that aggressively reduce their emissions can trade their surplus allowances to firms who find it more expensive to reduce their emissions. In the early stage of the program, most allowances will be distributed for free to provide a smooth transition into the program, allowing those covered by the program to focus on investing in emission reductions and cleaner technologies, and limiting any concerns about competitiveness and emissions leakage.

Under the cap-and-trade program, offset credits can be used by covered entities to meet a portion of their compliance obligation. An offset is a credit that represents a reduction of greenhouse gases resulting from an activity that can be measured, quantified, and verified. Each offset credit represents a specific quantity of emission reductions from a source not directly covered by the cap-and-trade program.

Implementation and enforcement of the cap-and-trade program will be key in ensuring that California meets it AB 32 goals. The proposed regulation includes strict rules for reporting emissions and trades, with substantial penalties for violations. Transparency in the trading process is important to avoid market volatility and manipulation.

This section provides a high-level overview of the elements of the proposed cap-and-trade program. Each design element is discussed in more detail later in this chapter.

Cap-and-Trade

In the proposed program, a limit, or cap, is put on the amount of GHGs that can be emitted by all covered sectors. The total number of allowances created is equal to the cap set for cumulative emissions from all the covered sectors. In addition to allowances, credits for a limited amount of emissions reductions from sources that are outside the cap coverage, called *offsets*, will be allowed for compliance. The use of offsets will allow emissions in the capped sectors to slightly exceed the allowances issued, though these additional emissions from capped sectors will be matched by

emission reductions that result from offset projects. The term *compliance instrument* covers both allowances and offsets. These compliance instruments may be traded among entities. At the end of each three year *compliance period*,[1] covered entities are required to turn in, or *surrender*, enough compliance instruments to match their emissions during this time period. Each allowance equals one metric ton of carbon dioxide equivalent. Since the program includes some GHGs (e.g., methane) that are more effective at trapping heat than carbon dioxide, all emissions are measured in units relative to the heat trapping potential of carbon dioxide or CO_2e, the "e" standing for "equivalent".

The cap-and-trade program puts a price on emitting carbon. This price provides incentives for GHG emission reductions and innovation. It can stimulate reductions for all covered sectors without requiring individual regulations for all GHG emissions. Pricing carbon in this way ultimately creates a market for finding the most cost-effective emission reductions. Providing entities the flexibility to find the most cost-effective reductions lowers the overall cost of the program. Creating a market provides more flexibility than direct regulation can and provides incentives that can spur local investment and the use of green technologies.

Fundamental Elements of the Cap-and-Trade Program

The following elements constitute the basic components of the proposed cap-and-trade program.

Scope

The proposed regulation phases sectors into the program. Under this phased approach, entities in the following sectors will be covered in the program according to the following timelines:

Starting in 2012 (first compliance period):

- Electricity generation, including electricity imported from outside California; and
- Large industrial sources with GHG emissions at or above 25,000 metric tons of carbon dioxide equivalent ($MTCO_2e$).

Starting in 2015 (the second compliance period), the program expands to include fuel distributors in order to cover emissions associated with:

- Combustion of gasoline, diesel, natural gas, and propane from sources with emissions below 25,000 $MTCO_2e$, including all commercial, residential, and small industrial sources; and

[1] A compliance period is the length of time for which covered entities must submit compliance instruments equal to their verified emissions.

- Fuels used for transportation.

All sectors listed above will be covered through 2020.

The Cap

The limit on GHG emissions—the cap—is a critical part of the cap-and-trade program design because it determines the number of total allowances ARB issues. The cap is set in the proposed regulation and consists of annual cap numbers, also referred to as "budgets." Staff included annual numbers through 2020 in the proposed regulation to allow entities that have a compliance obligation to know how many allowances will be available from 2012 through 2020.

The initial cap level in 2012 will be set at the level of emissions expected from covered sources for that year – at 165.8 million $MTCO_2e$ ($MMTCO_2e$). The cap then declines in starting in 2013 until 2015. In 2015 the cap will be expanded to include GHG emissions from fuel suppliers. This expansion is based on the level of GHG emissions expected from the covered fuels for the year 2015, resulting in a cap for 2015 of 394.4 $MMTCO_2e$. The cap will then continue to decline from 2015 to 2020.

The level of the cap is critical to the environmental effectiveness of the cap-and-trade program. If the cap is not set at a stringent enough level to drive GHG emission reduction activities, the environmental goals of the program may not be met even if all sources comply with program requirements. Staff has designed the program to be sufficiently stringent to spur GHG emission reductions to achieve AB 32 goals. Staff has set the cap for 2020 at 334 $MMTCO_2e$, which is designed to allow California to achieve the AB 32 target in 2020.

Allowances

As discussed previously, an allowance is equal to one metric ton of CO_2e. ARB will issue a total of approximately 2.7 billion allowances for the cap-and-trade program through the year 2020. Annual allowance budgets for calendar years 2012–2020 are established in the proposed regulation, so that the total number of allowances issued in each year through 2020 are known. At the end of a compliance period, each covered entity is required to surrender allowances (and if it elects, a limited amount of offsets) equal to its total GHG emissions during that compliance period. ARB will also require entities to surrender compliance instruments to match a portion of their reported emissions each year during the three-year compliance period to reduce the risk of non-compliance at the end of the three year period. When compliance instruments are surrendered, ARB will permanently retire them.

Covered entities are not the only entities that may hold and trade allowances in the program. Entities in covered sectors with emissions less than 25,000 $MTCO_2e$ may voluntarily elect to become covered entities. Other non-covered entities may be eligible to participate voluntarily. Some examples of these non-covered entities include financial institutions or brokers, offset developers, and those who may want to obtain and voluntarily retire allowances. Once an entity holds an allowance, it can: 1)

surrender it to comply with an obligation under the regulation: 2) bank it for future use; 3) trade it to another entity; or 4) ask ARB to retire it.

Staff proposes to create a gradual transition into the program through the design of the allocation system. ARB will rely primarily on free allocation at the start of the program to minimize near-term costs to California consumers and businesses and to minimize emissions leakage. The allocation design will reward those who have invested in energy efficiency and GHG emission reductions and will encourage continued investment in clean and efficient technologies in the future.

The outset of the program will include a small direct auction that includes a consignment feature for allowances allocated to electricity distribution utilities. Staff designed an auction program that will allow for broad participation by diverse market players and minimize the chances for manipulation. The auction is set up in a way to ensure that allowances go to those market participants that place the highest value on them.

Cost Containment Mechanisms

The proposed cap-and-trade program includes a number of mechanisms designed to minimize the costs of reducing GHGs without compromising the environmental integrity of the program. Some of the mechanisms that staff proposes in the cap-and-trade regulation are three-year compliance periods, banking, offsets, the Allowance Price Containment Reserve, and linkage to other trading systems.

Three-year Compliance Period

A number of significant sources of California emissions are subject to significant year-to-year variations – for example, electricity sector emissions increase in low water years as lower hydropower production is replaced with natural gas generation. For this reason, the proposed program has been designed with a three-year compliance cycle to help smooth out these annual variations, and to provide sources with greater flexibility to reduce emissions.

Banking

In a cap-and-trade program, banking allows participants to hold spare allowances and use them for compliance in a later period. The ability to bank allowances provides an incentive for covered entities to make early reductions since the declining cap could push allowance prices higher over time. Staff proposes to allow banking of allowances without restriction.

Offset Credits

Under the proposed program, covered entities may use offset credits to satisfy a portion of their compliance obligation. In addition to providing compliance flexibility, the inclusion of offsets in the program will support the development of innovative projects and technologies from sources outside capped sectors that can play a key role in reducing emissions both inside and outside California.

Offsets must meet rigorous criteria that demonstrate that the emissions reductions are real, permanent, verifiable, enforceable, and quantifiable. To be credited as an offset, the action or project must also be additional to what is required by law or regulation or would otherwise have occurred. Under the program, ARB will issue or recognize an offset credit that could be used by a covered entity instead of turning in an allowance for the equivalent amount of CO_2e emitted.

The proposed program imposes a limit on the amount of offsets that an individual covered entity can use for compliance. Allowing a limited number of offsets into the program provides benefits and ensures that some GHG emission reductions occur within the sectors covered by the cap-and-trade program. The proposed program includes provisions that would allow a maximum of 232 million $MTCO_2e$ of offsets through the year 2020. This limit will be enforced through a limit on the use of offsets by an individual entity equal to eight percent of its compliance obligation. Combined with the Allowance Price Containment Reserve, this limit ensures that a majority of reductions from the program come from sources covered by the program at expected allowance prices, while use of the reserve will relax that constraint if prices rise.

Allowance Price Containment Reserve

Staff proposes to establish an Allowance Price Containment Reserve (the Reserve). The Reserve is an account that is filled with a specified number of allowances removed from the overall cap at the beginning of the program. Covered entities may purchase reserve allowances at specified prices during direct quarterly sales. Covered entities gain flexibility through access to the Reserve if prices are high or entities expect prices to be high in the future. Staff proposes the Reserve be filled with 121 million allowances out of the total of approximately 2.7 billion issued for the years 2012 to 2020.

To ensure that allowance prices do not get too low to stimulate emission reductions, the proposed regulation establishes a price floor at the auction of $10 per ton. Allowances that are unsold at auction will be added to the Reserve. This may happen if not all allowances are sold at the price floor of $10.

Linkage to Other Greenhouse Gas Emissions Trading Systems

Linkage is the reciprocal acceptance of compliance instruments issued by another system. California could decide to link its cap-and-trade program to other emissions trading systems of similar scope and rigor, and has been working with our WCI partners to create the framework for a regional system of linked programs. Linkage can expand the coverage of the cap-and-trade program to include emission reduction opportunities for sources covered in another program. The proposed regulation establishes a framework for linkage. Each program considered for linkage would by subject to Board action, and will undergo a case-by-case analysis by staff as part of a formal rulemaking process.

Although the regulation does not propose to link to any programs at this time, four programs are candidates for linkage before the 2012 start date. Currently four other WCI partners are working to implement cap-and-trade programs consistent with the

Design for the WCI Regional Program by January 2012: New Mexico, British Columbia, Quebec, and Ontario. Linking to WCI partners has several advantages for California. The reduction of GHG emissions that can be achieved collectively by the WCI partner jurisdictions are approximately double what can be achieved through a California-only program. The broad scope of a WCI-wide market will provide additional opportunities for reduction of emissions, therefore providing greater market liquidity and more stable carbon prices within the program.

California and other WCI partners have also been participating in the Three Regions collaborative process with representatives from the jurisdictions in the Regional Greenhouse Gas Initiative and the Midwestern GHG Reduction Accord. The Three Regions have joined in a cooperative effort to share experiences in the design and implementation of regional cap-and-trade programs, inform federal decision making on climate change policy, and explore the potential for further collaboration among the three regional programs in the future.

Program Implementation

Assuming the design of the cap-and-trade program is approved by the Board, significant work will be needed to implement the regulation. Two primary areas that will require attention are finalizing the details of the allocation system for allowances, and designing and implementing a market tracking system. ARB staff is working closely on both efforts with our partners in the WCI, since coordinated approaches to allocation and the tracking system will simplify linking the individual programs into a regional market system. ARB staff believes that it is important for California to start its program in conjunction with our WCI partners.

Compliance and Enforcement

A robust enforcement program will play a vital role in the success of the cap-and-trade program by discouraging gaming of the system and deter and punish fraudulent activities. One allowance is needed to cover one metric ton of a covered entity's emissions, if they are turned in by the compliance deadline. If an entity does not meet the compliance deadline it will need to surrender additional allowances. Staff designed the proposed regulation to remove, to the extent possible, financial incentives for noncompliance and to make sure that every ton of GHG emitted is covered by a valid compliance instrument.

To develop the enforcement program for cap-and-trade, staff consulted with legal and enforcement staffs from state and federal agencies to gain insight in this area. These agencies included the California Environmental Protection Agency, California Attorney General's Office, the California Energy Commission, the California Public Utilities Commission, the Department of Water Resources, United States Department of Justice, the United States Securities and Exchange Commission, and the United States Commodities and Futures Trading Commission. In addition, staff consulted with academic institutions including U.C. Berkeley's Center for Law, Energy, and the Environment and legal scholars from other universities.

Adaptive Management

The cap-and-trade program is made up of many elements, must serve a large number of important objectives at the same time, and relies on the cumulative actions of a large number of participants operating in a complex market system. Accordingly, unanticipated effects and results undoubtedly could occur over the life of the program. ARB, therefore, is committed to using an adaptive management process to review and revise policies, protocols, and procedures as more information becomes available.

2. Project Alternatives

CEQA Guidelines section 15126.6(a) requires evaluation of "a range of reasonable alternatives to the project, or the location of the project, which would feasibly attain most of the basic project objectives but would avoid or substantially lessen any of the significant effects, and evaluate the comparative merits of the alternatives." The purpose of the alternatives analysis is to determine whether or not a variation of the proposed project would reduce or eliminate significant project impacts, within the basic framework of the basic project objectives. Alternatives considered in an environmental document should be feasible and should attain basic project objectives. The project alternatives are summarized below:

a. Do Not Implement the Cap-and-Trade Program ("No Project" Alternative)

CEQA requires a specific alternative of "No Project" to be evaluated. In this case, the No Project Alternative would mean no cap-and-trade regulation, but other measures from the Scoping Plan would continue to be implemented. Under this alternative, California would not meet the 2020 AB 32 goal.

b. Alternatives to Specific Cap-and-Trade Program Design Features Alternative

The cap-and-trade regulation could be designed differently than the proposed regulation, which provides opportunities to define alternatives for the FED analysis.

Border Adjustments

Border adjustments are a way to place a price, in the form of allowances or dollars, on the GHG emissions associated with imports, and are meant to create a level playing field when regulations vary across jurisdictions. ARB is proposing to utilize a "first jurisdictional deliverer" approach in the electricity sector – a form of border adjustment – because sufficient information is available on the generation and distribution of electricity imported to California. For non-electricity goods, the program would address leakage through output based free allocation in which facilities received free allocation of allowances based on their output and industry benchmarks. The proposed regulation could instead be designed to include border adjustments for all products and fuels that are imported into the state.

100 Percent Auction of Allowances

The proposed regulation currently proposes that some allowances would be freely allocated or some allowances would be sold at auction. To allow a smooth transition, staff proposes to freely distribute a substantial number of allowances in the early years of the program. Auction proceeds would be deposited into the Air Pollution Control Fund. As a design option, the regulation could be designed with up to 100 percent auctioning of allowances.

Different Offset Limit

The proposed regulation allows the use of offset credits for up to eight percent of a covered entity's compliance obligation. The range of possible options regarding the use of offsets within the regulation is wide; they may be disallowed, or conversely, be unlimited. Offset project locations may be restricted to California, or have no geographic limits placed on them. Offsets could also be limited to the proposed offset protocols which include the Forest, Urban Forest, Livestock, and Ozone Depleting Substances Offset Protocols, or expanded to include additional protocols.

Other Program Design Options

Additional design options include facility-specific caps, restricting trading in impacted locations, and disallowing banking of allowances.

Not Linking to Other Cap-and-Trade Programs

The proposed regulation is designed to allow linkage with WCI jurisdictions' cap-and-trade programs. The regulation could be designed to be a California-only program, or it could be designed so that there is linkage with programs other than those in WCI jurisdictions. No linkages are proposed as part of this action.

c. Implement Only Additional Source-Specific Command-and-Control Regulations Alternative

Instead of pursuing a cap-and-trade regulation, ARB could pursue source-specific emissions limits by regulation to make up the emissions reductions that the Scoping Plan identifies as coming from cap-and-trade. This would involve a regulatory "command-and-control" approach, rather than a carbon-trading, economic-incentive approach. Command-and-control regulations can take several forms, including (a) compelling the use of a specific pollution abatement technology, or (b) setting a source-specific emissions limitation.

d. Carbon Fee Alternative

Under this alternative, Scoping Plan measures other than cap-and-trade would continue, but ARB would also pursue a carbon fee for the sectors covered by the proposed cap-and-trade regulation. In other words, this alternative would replace the cap-and-trade regulation with a carbon fee. A carbon fee, like a cap-and-trade regulation, is a way to price carbon. However, while cap-and-trade sets a declining cap on emissions through the limit on the number of allowances, a carbon fee does not, allowing sources to emit up to any amount on which they would be willing to pay fees.

e. Cap-and-Trade Linked with a Federal Cap-and-Trade Program

Federal climate change legislation has been tabled for this congressional session (two calendar years, 2009 and 2010). ARB is moving forward with its development of the cap-and-trade program; however, if a federal cap-and-trade program is established, it is uncertain how existing state and regional cap-and-trade programs would interact with a federal program. ARB would remain involved with providing input on legislative language, policy, and other key components of a federal program. In response to the lack of federal climate change legislation, the U.S. Environmental Protection Agency (U.S. EPA) is developing regulations that would control GHG emissions from mobile and stationary sources.

Because Federal legislation has been tabled, it is speculative to predict the structure and content of a Federal cap-and-trade program. It is uncertain whether or how it would affect California programs. Therefore, its implications for environmental impacts are also too speculative for meaningful analysis. This alternative will not be discussed further.

E. Summary of Environmental Impacts and Mitigation

1. Compliance Responses and Offset Protocols

This section summarizes the potential impacts that could result from implementation of the covered entity compliance responses. The reasonably foreseeable covered entity compliance responses are (1) Upgrade Equipment, (2) Decarbonization (fuel switching), (3) Implement Process Changes, and (4) Surrender Compliance Instruments, and implementation of offset projects under four offset protocols: Ozone Depleting Substances (ODS), Livestock, Urban Forest, and Forest. Summary impact matrices are included in this FED for the compliance responses and for each of the protocols.

2. Aesthetics

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes at existing facilities, and as such would not change the character of the project sites.

The ODS Offset Protocol would not introduce activities that would disrupt aesthetic or visual settings. The Livestock Offset Protocol would include the construction of digesters in agricultural settings. Digesters are consistent with agricultural uses and would not represent an adverse change to the visual character of the vicinity. The Urban Forest Offset Protocol would improve the quality of the urban visual environment and would be considered aesthetically beneficial. The Forest Offset Protocol would not increase the amount of forest activities, but could shift activities to projects that increase carbon sequestration. This shift could change the visual character of offset project sites over time, but would not pose an adverse visual impact. Managing forests to increase cover and remove dead and diseased trees may be a visually beneficial effect.

3. Agricultural and Forest Resources

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes at existing facilities, and as such would not be expected to impact agriculture or forest resources.

The ODS Offset Protocol would not include activities that impact agriculture or forest resources. The Livestock Offset Protocol would include the construction of digesters in agricultural settings. Digesters are consistent with agricultural uses and would not represent an adverse change to agriculture or forest resources. The Urban Forest Offset Protocol would not impact agriculture or forest resources. The Forest Offset Protocol would not increase the amount of forest activities, but could shift activities to projects that increase carbon sequestration. Managing forests to increase cover and remove dead and diseased trees may be considered a beneficial impact to forests. The Forest Offset Protocol does not include actions that would encourage the conversion of agricultural land to forest.

4. Air Quality

The proposed cap-and-trade program is designed to reduce GHG emissions. However measures that reduce GHG emissions are expected to provide co-benefits as reductions of criteria pollutant and toxic emissions. Statewide, the level of GHG, criteria pollutant, and toxic emissions is expected to be reduced as a result of the cap-and-trade program. This is a beneficial effect.

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes at existing facilities. Construction, grading and trenching have the potential to adversely impact air quality. Recognized measures exist to reduce this potentially significant impact, but the authority to determine project-level impacts and require project-level mitigation lies with the permitting agency for individual projects. Further, the programmatic analysis does not allow project-specific details of mitigation, resulting in an inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that this potentially significant impact may be unavoidable.

There is a possibility that some covered entities might increase operation of specific equipment which could increase local emissions. ARB believes that resulting localized air impacts are extremely unlikely, but cannot say that such increases could never occur. ARB proposes an adaptive management approach to address this impact. Because the authority to determine project-level impacts and require project-level mitigation lies with the permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the

potentially significant impacts. Consequently, the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that this potentially significant impact may be unavoidable.

The ODS Offset Protocol and the Livestock Offset Protocol would produce incidental emissions from transportation and construction which would be less than significant. Both of these protocols reduce GHG emissions, considered a beneficial effect and less than significant.

Projects implemented under the Urban Forest Offset Protocol would produce incidental emissions that would be less than significant. The Forest Offset Protocol would not alter the level of forest activities and therefore would have a less than significant air quality impact.

5. Biological Resources

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes at existing facilities. Construction, grading and trenching have the potential to adversely impact any protected biological resources that might exist at those locations. Recognized measures exist to reduce this potentially significant impact, but the authority to determine project-level impacts and require project-level mitigation lies with the permitting agency for individual projects. Further, the programmatic analysis does not allow project-specific details of mitigation, resulting in an inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that this potentially significant impact may be unavoidable.

The ODS Offset Protocol would not include activities that potentially impact biological resources. The Livestock Offset Protocol would include the construction of digesters at or adjacent to existing livestock operations where natural habitats are expected to be absent or limited. As such, the Livestock Offset Protocol would result in less than significant impacts to biological resources. The Urban Forest Offset Protocol recognizes tree improvement projects in urban settings, and as such would not be expected to significantly affect biological resources. The Forest Offset Protocol would not increase total forest activities, but could shift activities to projects that increase carbon sequestration. Reforestation projects conducted under the Forest Offset Protocol could change existing habitat and disrupt wildlife. ARB will implement adaptive management to monitor and, where feasible, reduce this impact. The authority to determine project-level impacts and require project-level mitigation lies with the permitting agency for individual projects. Further, the programmatic analysis does not allow project-specific details of mitigation, resulting in an inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, the FED takes the conservative approach in its post-mitigation significance conclusion and

discloses, for CEQA compliance purposes, that this potentially significant impact may be unavoidable.

6. Cultural Resources

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes at existing facilities. Construction, grading and trenching have the potential to adversely impact any cultural resources that might exist at those locations. Recognized measures exist to reduce this potentially significant impact, but the authority to determine project-level impacts and require project-level mitigation lies with the permitting agency for individual projects. Further, the programmatic analysis does not allow project-specific details of mitigation, resulting in an inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that this potentially significant impact may be unavoidable.

The ODS Offset Protocol would not include activities that potentially impact cultural resources. The Livestock Offset Protocol would include the construction of digesters at or adjacent to existing livestock operations where cultural or historic features could exist. Similarly, the Urban Forest Offset Protocol includes projects in urban settings where cultural and historic resources could exist. Although recognized mitigation measures exist to reduce these potential impacts, the authority to require project-specific mitigation lies with local permitting agencies and not ARB. Consequently, these impacts are conservatively identified as significant and unavoidable. The Forest Offset Protocol could change the type of forest projects that are undertaken, but would not alter the overall level of forest activities, and as such would not increase potential impacts to cultural resources. This impact would be less than significant.

7. Energy Demand

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes. These actions will reduce overall energy demand and are considered beneficial effects.

Projects implemented under the compliance offset protocols would not increase energy demand, and as such pose no impacts or less than significant impacts to energy demand.

8. Geology, Soils, and Mineral Resources

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes at existing facilities. Construction, grading and trenching have the potential to result in adverse soil erosion, dust generation, and sedimentation of local waterways.

Recognized measures exist to reduce this potentially significant impact, but the authority to determine project-level impacts and require project-level mitigation lies with the permitting agency for individual projects. Further, the programmatic analysis does not allow project-specific details of mitigation, resulting in an inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that this potentially significant impact may be unavoidable.

The ODS Offset Protocol would pose no significant impacts on geology, soils and mineral resources. The Livestock Offset Protocol would include the construction of digesters that would be subject to regulations considered sufficient to mitigate potential impact to geology, soils and mineral resources to a less than significant level. The Urban Forest Offset Protocol would result in only minor soil disturbance and would not be expected to adversely impact geology, soils or mineral resources. This impact would be less than significant. The Forest Offset Protocol would not increase total forest activities, but could shift activities to projects that increase carbon sequestration. Because the overall level of forest activities would not change, this impact would be less than significant.

9. Greenhouse Gases

Implementation of the cap-and-trade program is expected to continue to improve air quality. The existing conditions projected to 2020 GHG are estimated to be 507 $MMTCO_2e$. AB 32 Scoping Plan measures would achieve an estimated 62 $MMTCO_2e$ reductions by 2020, resulting in 2020 statewide emissions of 445 $MMTCO_2e$. The AB 32 emissions reduction target is 427 $MMTCO_2e$. The proposed cap-and-trade regulation would need to reduce 18 $MMTCO_2e$, i.e. the balance needed to reach the target if all of the Scoping Plan measures achieve their expected reductions. If any measures are less effective than envisioned, cap-and-trade would need to achieve greater reductions to make up any shortfall. This is considered a beneficial effect.

10. Hazards and Hazardous Materials

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes at existing facilities. The use of hazardous materials is common practice in industrial settings. Implementation of compliance responses could include the use of hazardous materials, but this would be considered simply an extension of business as usual for most covered entities, mitigated by existing practices and regulations, and thus considered less than significant.

Offset projects implemented under the proposed offset protocols may result in the use or transport of hazardous materials that require special handling and disposal. All projects would be required to comply with established local, state, and federal laws pertaining to the use, storage, and transportation of these materials. Assuming

compliance with applicable laws and regulations, the impacts would be less than significant.

11. Hydrology and Water Quality

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes at existing facilities. Construction, grading and trenching have the potential to result in adverse soil erosion resulting in sedimentation and degradation of local waterways. Recognized measures exist to reduce this potentially significant impact, but the authority to determine project-level impacts and require project-level mitigation lies with the permitting agency for individual projects. Further, the programmatic analysis does not allow project-specific details of mitigation, resulting in an inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that this potentially significant impact may be unavoidable.

The ODS Offset Protocol would have no adverse impacts on hydrology and water quality. The Livestock Offset Protocol would include the construction of digesters that would be subject to regulations which are considered sufficient to mitigate potential impacts to hydrology and water quality to a less than significant level. The Urban Forest Offset Protocol would result in only minor soil disturbance resulting in less than significant impacts to hydrology or water quality. The Forest Offset Protocol would not increase total forest activities, but could shift activities to projects that increase carbon sequestration. Because the overall level of forest activities would not change, the potential to adversely impact hydrology and water quality would not change. This impact would be less than significant.

12. Land Use and Planning

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes at existing facilities, and as such would be consistent with the existing land use and would pose a less than significant land use and planning impact.

The ODS Offset Protocol would use existing facilities, representing a less than significant impact to land use and planning. The Livestock Offset Protocol would allow the construction of digesters in agricultural settings. Digesters are an allowed use in agricultural areas. As such, their construction would not conflict with existing land use plans, and thus would be a less than significant impact. Projects implemented under the Urban Forest Offset Protocol would not conflict with land use plans, resulting in a less than significant impact. The Forest Offset Protocol includes avoided conversion projects that could conflict with local land use plans that envision development or other uses of forested areas. The authority to determine project-level impacts and require project-level mitigation lies with the permitting agency for individual projects. Further, the

programmatic analysis does not allow project-specific details of mitigation, resulting in an inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant impact described as possible conflicts between the “avoided conversion” element of the Forest Offset Protocol and land use plans may be unavoidable.

13. Noise

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes. Construction has the potential to introduce short-term noise levels that would exceed acceptable ambient levels. Because of the short-term nature of construction, and the industrial setting in which these noises would occur, this impact would be less than significant. Recognized measures exist that are implemented as standard practice to minimize construction noise.

The ODS Offset Protocol would not result in significant adverse noise impacts and is identified as less than significant. The Livestock Offset Protocol would allow the construction of digesters in agricultural settings. Construction of digesters could adversely impact sensitive receptors and is considered a significant and unavoidable impact. Recognized measures exist to reduce this potential impact, but the authority to require project-specific mitigation lies with local permitting agencies and not ARB. Consequently, this impact is identified as significant and unavoidable. Projects implemented under the Urban Forest Offset Protocol would not produce unacceptable noise levels and is considered a less than significant impact. Projects implemented under the Forest Offset Protocol would occur in forested areas. Forest projects would produce elevated noise levels that exceed accepted ambient levels. However, adoption of the Forest Offset Protocol would not alter the extent of forest activities, but would simply shift some activities to projects that sequester carbon. Because the level of overall forest activities would not change, the consequential noise impacts would not change. Thus, this impact is considered less than significant.

14. Employment, Population and Housing

The cap-and-trade program, including the proposed compliance offset protocols and associated offset projects would not result in significant adverse impacts to employment, population, or housing. All impacts to population, employment, and housing would be less than significant.

15. Public Services

The cap-and-trade program, including the proposed compliance offset protocols and associated offset projects would not result in adverse impacts to public services. All potential impacts to public services would be less than significant.

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes. These projects would not increase the level of public services beyond that already provided to existing facilities. The ODS Offset Protocol, the Livestock Offset Protocol, and the urban forest protocol and associated projects would not result in a need for an increased level of public services beyond that already provided to existing facilities. The Forest Offset Protocol would not alter the extent of forest activities, but would shift some activities to projects that sequester carbon. Because the level of overall forest activities would not change, the consequential need for public services would not change. Thus, this impact is considered less than significant.

16. Recreation

The cap-and-trade program, including the proposed compliance offset protocols and associated offset projects would not result in adverse impacts to public services. All potential impacts to public services would be less than significant.

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes. These actions would have a less than significant impact on recreation resources.

The ODS Offset Protocol, the Livestock Offset Protocol, the Urban Forest Offset Protocol, and associated offset projects would result in a less than significant impact on recreation resources. Forest management activities could disrupt opportunities for forest recreation, but such disruptions exist under current conditions. Offset projects developed under the proposed offset protocol would include the construction of roads, temporary closures for tree installation and periodic increases in truck or construction equipment traffic that could disrupt recreational activities, but forest projects developed under the Forest Offset Protocol would occur on land that was historically forested or currently forested, and consequently, the overall impact to recreational resources would be less than significant.

17. Transportation and Traffic

Implementation of covered entity compliance responses is not expected to result in significant adverse impacts to transportation or traffic. If a facility expands or requires construction to take place, increases in construction traffic would be temporary and considered less than significant. Construction traffic impacts can be mitigated through ingress and egress controls, traffic controls, and reduced speed zones to ensure safety. Activities undertaken to develop offset projects would be expected to vary according to

the type of offset project. Transportation and traffic impacts resulting from the implementation of ODS, Livestock and Urban Forest Offset Protocol projects would be less than significant. Construction of livestock digesters could require the operation of heavy equipment on rural roads, potentially creating unsafe conditions. Recognized measures exist to reduce this potentially significant impact, but the authority to determine project-level impacts and require project-level mitigation lies with the permitting agency for individual projects. Further, the programmatic analysis does not allow project-specific details of mitigation, resulting in an inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that this potentially significant impact may be unavoidable.

18. Utilities and Service Systems

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes. These projects would not increase the level of utilities beyond that already provided to existing facilities. Fuel switching could require provision of new services. The availability and extension of utilities is subject to approval of the local utility provider, and thus mitigated to less than significant.

The ODS, Livestock, and Urban Forest offset protocols would not result in a demand for a significant increase in the level of utilities or service systems that may serve existing sites. Construction of new facilities could require the incidental extension of utilities and services. The availability and extension of utilities is subject to approval of the local utility provider, and thus mitigated to less than significant.

The Forest Offset Protocol would not alter the extent of forest activities, but could increase forest projects to sequester carbon. Because the level of overall forest activities would not change, the consequential need for utility service systems associated with those activities would not change. Thus, this impact is considered less than significant.

F. Areas of Controversy and Issues to be Resolved

1. Air Quality and the Potential for Localized Impacts

An advantage of the cap-and-trade approach to achieving GHG emissions reduction goals is that it gives facility owners more flexibility to determine the most cost-effective way to meet emissions reduction targets than a command and control approach with prescribed control measures would allow. The ability to procure allowances and offsets increases this flexibility and can help reduce the overall cost of meeting California's GHG emissions reduction goals. While cap-and-trade does not encourage or discourage growth, a facility must acquire GHG allowances or offsets in order to comply with the regulation. Some covered entities would reduce emissions to lessen their

compliance obligation, while others may choose to surrender allowances and/or offsets rather than reduce emissions. The proposed cap-and-trade regulation does not stipulate measures (compliance responses) or locations where emissions reduction measures must be implemented, but rather relies on market conditions to influence how individual entities choose to comply with the regulation. The reduction measure chosen by the regulated entity (its compliance response) is generally expected to be the least costly action and would be the initial measure implemented. As future cap levels are reduced and the emission reductions obtained from the initial least expensive measure are exhausted, entities would be reasonably expected to shift to the next least expensive measure. It should be noted that other considerations, including air pollution permits and regulations, may influence which compliance responses are employed.

With the flexibility of cap-and-trade, however, comes certain concerns for people who live near large GHG emitting facilities or in areas already impacted by air pollution. Some stakeholders are concerned that if nearby facilities purchase off-site GHG reductions to meet their targets rather than achieving the reductions in their community, the local community will miss out on potential co-benefits, specifically, reductions in localized air pollutants that would be reduced by the same actions that reduce GHG emissions.

A second concern expressed by some stakeholders is that the cap-and-trade program might result in localized air impacts. These stakeholders are concerned that the trading allowed under cap-and-trade might result in facilities in these same areas increasing their operations, while reductions in operations occur elsewhere. ARB notes that any substantial new or expansion of an existing facility, or new offsets projects, would subject to local review and regulation by the appropriate agencies through applicable state and local environmental review processes.

Based on the available information, ARB believes that localized air impacts caused by cap-and-trade are extremely unlikely, and, moreover, ARB cannot predict what such impacts might be or where they might occur. ARB cannot, however, say that localized increases in air pollution could never occur, and that any such increases could never have implications for public health. ARB seeks to ensure that the cap-and-trade program, as it operates over time, avoids and minimizes all instances of localized air quality impacts. Accordingly, ARB is committed to implementing adaptive management. (Refer to ARB Implementation Approach in the Project Description.)

2. Forest Project Offsets

Some stakeholders encourage a broad use of offsets, including international offsets to provide cost containment and encourage investment in technologies to reduce GHG emissions in uncapped sectors, while others are fundamentally opposed to their use as a cost containment mechanism. Offset projects allowed under the Forest Offset Protocol have raised some concerns about the potential environmental impacts.

Commenters have raised concerns related to the possibility that the Forest Offset Protocol might change forest practices in an unforeseen, unexpected and environmentally harmful way by creating incentives for less environmentally conservative management practices (e.g. use of even-age management, and change from native forests to tree plantations) and resulting in greater, unaccounted, carbon releases (e.g. from soil disturbance, lying dead wood). Based on the available data and current law and policies that regulate forest activities, ARB concludes that, while substantial impacts from forest project-related impacts attributable to the cap-and-trade program are unlikely, there is at least a possibility that such unintended impacts could occur. Accordingly, ARB will implement adaptive management. (Refer to ARB Implementation Approach in the Project Description.)

3. Issues to be Resolved

The task before ARB is challenging. It must construct a regulatory program to reduce greenhouse gas emissions to meet the 2020 cap, while at the same time ensuring that the program satisfies over 20 diverse and important goals and objectives, including minimizing costs, maximizing environmental and economic co-benefits, and avoiding increases in localized air pollution. Whatever program ARB designs will be necessarily complex, and unanticipated effects and results undoubtedly could occur over the life of such a program. In making its decision, ARB must resolve how best to balance the required objectives, and, at the same ensure that these objectives continue to be met over time. Accordingly, ARB is committed to monitoring the cap-and-trade program in a variety of areas, to ensure, among other things, achievement of the GHG emissions reduction limit, detection of market manipulation, and avoidance of unintended consequences (including leakage). (Refer to ARB Implementation Approach in the Project Description.)

1.0 INTRODUCTION AND BACKGROUND

A. Introduction

The California Environmental Quality Act (CEQA) and California Air Resources Board (ARB) policy require an analysis to determine any potentially significant adverse environmental impacts of ARB's regulations and projects. The cap-and-trade program is identified as one of the measures proposed in the Climate Change Scoping Plan (Scoping Plan) that was developed for the purpose of reducing emissions of greenhouse gases (GHGs) in California as directed by the California Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32, Chapter 488, Statutes of 2006). ARB has developed the proposed regulation for the cap-and-trade program including quantification methods intrinsic to four offset protocols that comprise a cost containment mechanism.

This document, known as a functional equivalent document (FED), summarizes and discusses the specific strategies in the cap-and-trade regulation and program that, if the regulation and program is adopted and implemented, would reduce GHG emissions throughout California, and their potential environmental impacts.

B. ARB's Certified Regulatory Program Under CEQA

In 1978, the Secretary of the Resources Agency determined that ARB's regulatory program meets the criteria for a Certified State Regulatory Program under Public Resources Code Section 21080.5. This certification exempts ARB's "adoption, approval, amendment, or repeal of standards, rules, regulations, or plans" from the requirements in CEQA for preparing Environmental Impact Reports (EIRs), negative declarations, and initial studies (See Cal. Code Regs., tit. 14, §§ 15250, 15251). As the statute provides, "when the regulatory program of a state agency requires a plan or other written documentation containing environmental information" describing the proposed activity, alternatives to the activity, and mitigation measures to minimize any significant adverse impacts on the environment, and the Secretary of the Resources Agency has certified the regulatory program, "the plan or other written documentation may be submitted in lieu of the environmental impact report …." The regulations that govern the operation of ARB's regulatory program are found at California Code of Regulations, Title 17, Sections 60005-60007.

ARB has drafted a FED for the cap-and-trade regulation that includes the substantive features of an EIR. ARB has used the Environmental Checklist as a basis for assessing the potential significant adverse environmental impacts associated with adoption and implementation of the cap-and-trade regulation. The FED includes an analysis of potential adverse environmental impacts, an analysis of alternatives, an analysis of cumulative impacts, and potential mitigation measures.

C. FED Structure and Organization

Under its CEQA certified regulatory program, ARB has prepared a programmatic FED that addresses direct and indirect impacts and identifies mitigation that reduces significant and potentially significant adverse effects on the environment where feasible. The FED is equivalent to an EIR.

Because the cap-and-trade program is multifaceted, the impact analysis for the covered entity compliance responses and compliance offset protocols are presented in discrete sections of the FED for readability. When ARB is adopting a rule or regulation, the CEQA guidelines require "an environmental analysis of the reasonably foreseeable methods by which compliance with that rule or regulation will be achieved" (CEQA Guidelines §15187[a]). The FED provides an overview of the covered entities' expected compliance responses. These include (1) Upgrade Equipment, (2) Decarbonization, (3) Implement Process Changes, and (4) Surrender Compliance Instruments, which include acquisition of allowances and/or offset credits. An analysis of the potential environmental impacts and mitigation associated with covered entities' compliance responses follows. Four protocols that comprise the proposed offset program are analyzed individually. A cumulative impact section examines impacts associated with the entire cap-and-trade program (including the protocols) in combination with the suite of ongoing, adopted, and reasonably foreseeable measures that are underway or planned for compliance with AB 32.

D. Scope of Analysis and Assumptions

The degree of specificity required in a CEQA document corresponds to the degree of specificity inherent in the underlying activity that it describes. The environmental analysis for certain types of projects cannot be as detailed as for other types of projects (Cal. Code Regs., tit. 14, §15146). For example, the assessment for a construction project would necessarily be more detailed than for the adoption of a plan because the construction effects can be predicted with a greater degree of accuracy (Id.). This analysis contains as much information as is currently available, without being speculative.

The scope of the analysis is intended to help focus public review and to assure that any questions and comments are appropriate and meaningful. This analysis specifically focuses on potential significant, adverse impacts on the physical environment in the context of changes from the existing State regulations and policies.

1. Adverse Environmental Impacts

The analysis of potential significant adverse environmental impacts from the proposed cap-and-trade regulation is based on the following assumptions:

a. This analysis primarily addresses the potential adverse environmental impacts resulting from implementing the proposed cap-and-trade regulation in lieu of

other GHG-reducing regulations that could be adopted with future compliance dates and other control measures.

b. The level of detail of the impact analysis reflects the programmatic nature of the cap-and-trade regulation and the fact that specific compliance projects would not be authorized by the adoption of the regulation. Specific projects would undergo their normally required environmental review and compliance processes.

c. Existing regulations and control measures other than the cap-and-trade proposal would not be affected or altered by the proposed regulation. Non-attainment criteria pollutants, toxic air contaminants (TACs), or ozone-depleting substances would continue to be regulated by command-and-control rules and regulations.

d. The cap-and-trade analyses evaluated emissions of criteria pollutants and TACs, impacts to the state's economy, compliance pathways to identify ways to reduce carbon emissions, and potential leakage and competitiveness issues that might arise from a California-only program. The environmental analysis in this FED reflects these evaluations. Speculation is discouraged under CEQA (CEQA Guidelines §15145). For example, as it relates to cap-and-trade, it is difficult to forecast future actions by other state or federal agencies that could influence GHG emissions, along with any adverse environmental impacts that may result.

e. The analysis of potential significant environmental impacts assumes that entities under the cap would comply using the least expensive technologies first. This may not always be the case in practice as other business considerations, permitting, and implementation issues will factor into an entity's decision-making.

2. Beneficial Effects

AB 32 establishes the objectives for GHG reduction activities in California. Section 38501(h) of AB 32 states:

> It is the intent of the Legislature that ARB design emissions reduction measures to meet the statewide emissions limits for GHGs established pursuant to this division in a manner that minimizes costs and maximizes benefits for California's economy, improves and modernizes California's energy infrastructure and maintains electric system reliability, maximizes additional environmental and economic co-benefits for California, and complements the state's efforts to improve air quality.

Although the primary focus of conventional CEQA impact assessment is identification and disclosure of adverse environmental impacts, §15149(b) of the Guidelines indicates:

> The EIR serves as a public disclosure document explaining the effects of the proposed project on the environment, alternatives to the project, and ways to minimize adverse effects and to increase beneficial effects.

Considering the legislative intent of AB 32 and the latitude under CEQA to recognize environmental co-benefits (beneficial effects), this FED incorporates discussion of potential beneficial environmental effects when those effects are considered reasonable and foreseeable, and they are relevant to the decisions to be made by ARB regarding the proposed regulation and program. In most instances it is not possible to quantify these effects because of the broad nature of this programmatic analysis. Potential beneficial effects are described within the body of the text of the various impact sections.

E. Incorporation of Documents by Reference

ARB hereby incorporates several documents by reference:

1. ARB-Prepared Documents

ARB prepared environmental documents for the recently approved Scoping Plan, the Low Carbon Fuel Standard (LCFS), and the Renewable Electricity Standard (RES), which ARB hereby incorporates by reference. All documents incorporated by reference are either available at the ARB's website, or at ARB, Climate Change Planning Section, 1001 "I" Street, Sacramento, CA.

The environmental analyses prepared for ARB policy and regulatory actions are necessarily programmatic. They may provide a basis for the project-specific environmental analyses and allow future analyses to focus solely on the new effects or detailed environmental issues not previously considered. While a program environmental document allows consideration of broad policy alternatives and program-wide mitigation, this environmental document is intended to disclose additional detail and information than was available at the time ARB developed the Scoping Plan FED. A programmatic document also plays an important role in establishing a structure within which future reviews and related actions can effectively be conducted. This concept of covering broad policies in a program document and incorporating by reference the information contained therein into subsequent documents for specific projects is known as "tiering" (CEQA Guidelines §15152).

This FED is Appendix O of the complete ARB staff report that is presented to the Board for consideration of the project. The Project Description section of this FED presents a summary of the proposed regulation, i.e. the Proposed Project under CEQA. A detailed description of the Proposed Project is in the "Staff Report: Initial Statement of Reasons for the Proposed Regulation to Implement the California Cap-and-Trade Program", date of release October 28, 2010, which is hereby incorporated by reference.

The analysis pertaining to the cap-and-trade regulation included in the Scoping Plan FED is incorporated by reference in the scope of this document (pursuant to CEQA Guidelines §15150). This FED is intended to disclose potential adverse impacts and identify potential mitigation specific to the cap-and-trade program recommendations. The cap-and-trade program is designed to create environmental benefits related to

GHG reduction and related air quality conditions. In some cases, as described elsewhere in the FED, potentially significant environmental effects to other environmental resources may occur. In general, proposed mitigation would be expected to reduce potentially significant impacts to less than significant levels, if agencies with mitigation implementation authority enforce the measures. The FED takes the conservative approach in its post-mitigation significance conclusions (i.e., tending to overstate the risk that feasible mitigation may not be sufficient or may not be implemented by other parties) and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable. It is expected that cap-and-trade program compliance and offset projects would be able to feasibly avoid or mitigate to a less than significant level many of these potentially significant impacts as an outcome of their project-specific environmental review processes and as a result of compliance with local and state laws and regulations.

This FED also incorporates by reference the ARB discussion of impacts to disadvantaged communities, in accordance with Senate Bill (SB) 115, Solis, 1999; California Government Code § 65040.12(c) and defined in statute by SB 115 (Solis, Chapter 690, Statutes 1999). California law requires state agencies to consider environmental justice in the rulemaking if such actions may have disproportionate effects on low-income or minority communities. In considering the cap-and-trade regulation impacts, staff used the California Environmental Protection Agency's "Intra Agency Environmental Justice Strategy" and "Environmental Justice Action Plan" as guidance (CalEPA 2004a, 2004b).

ARB prepared the Co-Pollutant Emissions Assessment for the proposed regulation which is incorporated by reference and presented as Appendix P of the Initial Statement of Reasons (ISOR). A major assumption is that existing federal and state programs to reduce criteria pollutants and TACs, as well as other climate policies, are implemented. It is also assumed that only GHG emission reductions that are additional to those achieved by the complementary policies (other plans, regulations or standards that directly or indirectly encourage or reinforce GHG emission reductions in key sectors) are attributed to the cap-and-trade regulation. These include the most recent California State Implementation Plan (SIP) and the Scoping Plan[2]. This does not include program design elements that are incorporated into the cap-and-trade regulation and program that maximize co-benefits. Also, no allowance value is assigned to projects, programs, or communities that decrease criteria pollutants or TACs.

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[2] The Scoping Plan contains the main strategies California will use to reduce the GHGs that cause climate change. The Scoping Plan has a range of GHG reduction actions that are referred to as "complementary policies", which include direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, market-based mechanisms such as a the proposed cap-and-trade regulation, and an AB 32 cost of implementation fee regulation to fund the program. The Scoping Plan was adopted by ARB in 2008. More information is available at http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm.

2. Other Incorporated Documents

Several other documents provide useful information in support of this FED and are also incorporated by reference. The following documents are incorporated by reference, in accordance with State CEQA Guidelines Section15150.

- California Air Resources Board (ARB). 2010. Allocating Emissions Allowances Under a California Cap-and-Trade Program Recommendations to the California Air Resources Board and California Environmental Protection Agency from the Economic and Allocation Advisory Committee. March 2010
    - The Economic and Allocation Advisory Committee prepared an updated economic analysis examining how economic factors would influence the allocation of emission allowances. The information in this report is relevant to the potential compliance responses addressed in the FED environmental analysis.
- California Energy Commission. 2010. Best Management Practices and Guidance Manual: Desert Renewable Energy Projects", September, http://www.energy.ca.gov/2010publications/REAT-1000-2010-009/REAT-1000-2010-009.PDF. The California Energy Commission (CEC) in partnership with California Department of Fish and Game (DFG), U.S. Bureau of Land Management (BLM), and U.S. Fish and Wildlife Service (USFWS) developed a draft "Best Management Practices and Guidance Manual: Desert Renewable Energy Projects" (CEC 2010). This document identifies Best Management Practices (BMPs) that apply to renewable energy facility impacts, and identifies a suite of measures that mitigate impacts that may also apply to projects associated with siting of new facilities related to the RES, the LCFS, or new combined heat and power (CHP) facilities.
- California Central Valley Regional Water Quality Control Board (CVRWQCB). 2010. Dairy Manure Digester and Co-Digester Facilities Draft Program Environmental Impact Report. SCH No. 201031085. July 2010
    - The Program EIR examines environmental impacts of dairy manure digester and co-digester facilities proposed in the Central Valley of California. Because the cap-and-trade program includes a Livestock Offset Protocol, the environmental impacts presented in this Program EIR are relevant to the FED analysis.

F. Summary of Project Alternatives

1. Do Not Implement the Cap-and-Trade Program ("No Project" Alternative)

CEQA requires a specific alternative of "No Project" to be evaluated. In this case, the No Project Alternative would mean no cap-and-trade regulation, but other measures

from the Scoping Plan would continue to be implemented. Under this alternative, California would not meet the 2020 AB 32 goal.

2. Alternatives to Specific Cap-and-Trade Program Design Features Alternative

The cap-and-trade regulation could be designed differently than the proposed regulation, which provides opportunities to define alternatives for the FED analysis.

Border Adjustments

Border adjustments are a way to place a price, in the form of allowances or dollars, on the GHG emissions associated with imports, and are meant to create a level playing field when regulations vary across jurisdictions. ARB is proposing to utilize a "first jurisdictional deliverer" approach in the electricity sector – a form of border adjustment – because sufficient information is available on the generation and distribution of electricity imported to California. For non-electricity goods, the program would address leakage through output based free allocation in which facilities received free allocation of allowances based on their output and industry benchmarks. The proposed regulation could instead be designed to include border adjustments for all products and fuels that are imported into the state.

100 Percent Auction of Allowances

The proposed regulation currently proposes that some allowances would be freely allocated or some allowances would be sold at auction. To allow a smooth transition, staff proposes to freely distribute a substantial number of allowances in the early years of the program. Auction proceeds would be deposited into the Air Pollution Control Fund. As a design option, the regulation could be designed with up to 100 percent auctioning of allowances.

Different Offset Limit

The proposed regulation allows the use of offset credits for up to eight percent of a covered entity's compliance obligation. The range of possible options regarding the use of offsets within the regulation is wide; they may be disallowed, or conversely, be unlimited. Offset project locations may be restricted to California, or have no geographic limits placed on them. Offsets could also be limited to the proposed offset protocols which include the Forest, Urban Forest, Livestock, and Ozone Depleting Substances Project Protocols, or expanded to include additional protocols.

Other Program Design Options

Additional design options include facility-specific caps, restricting trading in impacted locations, and disallowing banking of allowances.

Not linking to Other Cap-and-Trade Programs

The proposed regulation is designed to allow linkage with WCI jurisdictions' cap-and-trade programs. The regulation could be designed to be a California-only program, or it

could be designed so that there is linkage with programs other than those in WCI jurisdictions. No linkages are proposed as part of this action.

3. Implement Only Additional Source-Specific Command-and-Control Regulations Alternative

Instead of pursuing a cap-and-trade regulation, ARB could pursue source-specific emissions limits by regulation to make up the emissions reductions that the Scoping Plan identifies as coming from cap-and-trade. This would involve a regulatory "command-and-control" approach, rather than a carbon-trading, economic-incentive approach. Command-and-control regulations can take several forms, including (a) compelling the use of a specific pollution abatement technology, or (b) setting a source-specific emissions limitation.

4. Carbon Fee Alternative

Under this alternative, Scoping Plan measures other than cap-and-trade would continue, but ARB would also pursue a carbon fee for the sectors covered by the proposed cap-and-trade regulation. In other words, this alternative would replace the cap-and-trade regulation with a carbon fee. A carbon fee, like a cap-and-trade regulation, is a way to price carbon. However, while cap-and-trade sets a declining cap on emissions through the limit on the number of allowances, a carbon fee does not, allowing sources to emit up to any amount on which they would be willing to pay fees.

5. Cap-and-Trade Linked with a Federal Cap-and-Trade Program

Federal climate change legislation has been tabled for this congressional session (two calendar years, 2009 and 2010). ARB is moving forward with its development of the cap-and-trade program; however, if a federal cap-and-trade program is established, it is uncertain how existing state and regional cap-and-trade programs would interact with a federal program. ARB would remain involved with providing input on legislative language, policy, and other key components of a federal program. In response to the lack of federal climate change legislation, the U.S. Environmental Protection Agency (U.S. EPA) is developing regulations that would control GHG emissions from mobile and stationary sources.

Because Federal legislation has been tabled, it is speculative to predict the structure and content of a Federal cap-and-trade program. It is uncertain whether or how it would affect California programs. Therefore, its implications for environmental impacts are also too speculative for meaningful analysis. This alternative will not be discussed further.

2.0 PROJECT DESCRIPTION

The cap-and-trade program is also referred to as the cap-and-trade "regulation" in this document. A proposed regulation is approved by a decision-making body. The regulation serves as the foundation of a program.

A. Project Location

The proposed cap-and-trade regulation would cover electricity generation, including electricity imported into CA, large industrial sources of GHG emissions, combustion of gasoline, diesel, natural gas, and propane at commercial, residential and small industrial sources and fuels used for transportation within CA.

California is also working closely with six other states (Arizona, New Mexico, Oregon, Washington, Utah and Montana) and four Canadian provinces (British Columbia, Ontario, Manitoba, and Quebec) in the WCI to design a regional cap-and-trade program. If California's program links with any of these programs, the project location would include the linked states and provinces. No linkages are proposed at this time; however, future linkages are anticipated. Each linkage would be approved by the Board and subject to its own environmental review.

The proposed regulation allows the generation and use of offset projects, some of which would occur outside of California, and within the U.S. In the future, ARB could propose and adopt offset protocols that would be applicable outside of the U.S. If so, the project location would be appropriately broadened at that time.

B. Project Background

Cap-and-trade is a policy approach that sets a mandatory cap on emissions while providing emission sources flexibility in how they comply. Successful cap-and-trade programs provide strict environmental accountability without inhibiting economic growth, and reward innovations, efficiency, and early action. Cap-and-trade sets an overall cap on emissions for all sources under the program, and is selected in order to achieve a desired environmental effect. Individual control requirements are not specified for sources; instead, sources report their emissions and then surrender the equivalent number of allowances at the end of the compliance period. Allowance trading enables sources to design their own compliance strategy based on their individual circumstances while still achieving the overall emission reductions required to meet the cap (U.S. EPA, Cap and Trade: Essentials).

ARB's proposed cap-and-trade regulation is identified as one of the measures in the Scoping Plan to reduce GHG emissions in California to 1990 levels by 2020. Under AB 32, regulations to implement the cap-and-trade program must be adopted by January 1, 2011, with the program beginning in 2012. By providing a declining cap on 85 percent of the state's GHG emissions, the cap-and-trade program is an essential component of the overall plan to meet the 2020 target.

The Scoping Plan identified other measures to reduce GHGs by increasing the efficiency with which California uses all forms of energy and reducing dependence on fossil fuels. These measures are ongoing, adopted, or reasonably foreseeable, and would continue to be implemented regardless of the cap-and-trade regulation. However, even with these measures, ARB would fall short of its legal mandate to reduce GHG emissions to 1990 levels if the cap-and-trade program was not implemented. The ongoing, adopted, and reasonably foreseeable Scoping Plan measures are as follows:

Measures In Capped Sectors

Transportation

- T-1 Advanced Clean Cars
- T-2 Low Carbon Fuel Standard
- T-3 Regional Targets (SB 375)
- T-4 Tire Pressure Program
- T-5 Ship Electrification
- T-7 Heavy Duty Aerodynamics
- T-8 Medium/Heavy Hybridization
- T-9 High Speed Rail

Electricity and Natural Gas

- E-1 Energy Efficiency and Conservation
- CR-1 Energy Efficiency and Conservation
- CR-2 Solar Hot Water (AB 1470)
- E-3 Renewable Electricity Standard (20 percent-33 percent)
- E-4 Million Solar Roofs

Industrial Measures

- I-1 Energy Efficiency and Co-Benefits Audits for Large Industrial Sources

Measures In Uncapped Sources/Sectors

- H-1 Motor Vehicle A/C Refrigerant Emissions
- H-2 SF6 Limits on non-utility and non-semiconductor applications
- H-3 Reduce Perfluorocarbons in Semiconductor Manufacturing
- H-4 Limit High GWP use in Consumer Products
- H-6 Refrigerant Tracking/Reporting/Repair Deposit Program
- H-6 SF6 Leak Reduction and Recycling in Electrical Applications
- F-1 Sustainable Forests
- RW-1 Landfill Methane Control Measure

In addition to Scoping Plan measures, additional GHG reductions would be achieved by measures in the 2007 SIP including ship electrification, port drayage truck, and vessel speed reduction. The SIP covers In-Use Off-Road Equipment and In-Use Heavy-Duty Trucks, and ARB would soon consider adjustments to these rules designed to reduce the cost of compliance for these recession-impacted industries.

C. Project Objectives

CEQA Guidelines require the project description to contain "[a] statement of the objectives sought by the proposed project" (Cal. Code Regs., tit. 14, § 15124[b]). Project objectives guide the lead agency in "developing a reasonable range of alternatives" and "can aid the decision makers in preparing findings or a statement of overriding considerations, if necessary" (Id.).

Recognizing the requirements of AB 32 and the role of the cap-and-trade regulations in contributing to GHG emission reductions, the following project objectives are presented for the proposed cap-and-trade program:

1. ***Achieve technologically feasible and cost-effective aggregate reductions*** – to achieve the maximum technologically feasible and cost-effective reductions in GHG emissions in the aggregate from sources or categories of sources under the cap, in furtherance of achieving the statewide GHG emissions limit (Health & Saf. Code, § 38562, subd. (a) and (c);

2. ***Distribute allowances equitably*** -- to design, to the extent feasible, the distribution of emissions allowances in a manner that is equitable and seeks to minimize costs and maximize the total benefits to California, and encourages early action to reduce GHG emissions (Health & Saf. Code, § 38562, subd. (b)(1));

3. ***Avoid disproportionate impacts*** -- to ensure, to the extent feasible, that activities undertaken to comply with the regulations do not disproportionately impact low-income communities (Health & Saf. Code, § 38562, subd. (b)(2));

4. ***Credit early action*** -- to ensure, to the extent feasible, that entities that have voluntarily reduced their GHG emissions prior to the implementation of this regulation receive appropriate credit for early voluntary actions (Health & Saf. Code, § 38562, subd. (b)(3));

5. ***Complement existing air standards*** -- to ensure, to the extent feasible, that activities undertaken pursuant to the regulations complement, and do not interfere with, efforts to achieve and maintain national and California AAQS and to reduce TAC emissions (Health & Saf. Code, § 38562, subd. (b)(4));

6. ***Be cost-effective*** – to consider the cost-effectiveness of these regulations (Health & Saf. Code, § 38562, subd. (b)(5));

7. ***Consider a broad range of public benefits*** -- to consider overall societal benefits, including reductions in other air pollutants, diversification of energy sources, and other benefits to the economy, environment, and public health (Health & Saf. Code, § 38562, subd. (b)(6));

8. ***Minimize administrative burden*** – to minimize, to the extent feasible, the administrative burden of implementing and complying with the regulation (Health & Saf. Code, § 38562, subd. (b)(7));

9. ***Minimize leakage*** -- to minimize, to the extent feasible, leakage of emissions to states and countries without a mandatory GHG emission cap (Health & Saf. Code, § 38562, subd. (b)(8));

10. ***Weigh relative emissions*** -- to consider, to the extent feasible, the contribution of each source or category of sources to statewide emissions of GHGs (Health & Saf. Code, § 38562, subd. (b)(9));

11. ***Achieve real emission reductions*** – to ensure that GHG emission reductions achieved through a market- based compliance mechanism are real, permanent, quantifiable, verifiable and enforceable by the state board (Health & Saf. Code, § 38562, subd. (d)(1));

12. ***Achieve reductions over existing regulation*** – to ensure that the reductions from a market-based compliance mechanism are in addition to any GHG emissions reduction otherwise required by law or regulation, and any other GHG emissions reduction that would otherwise occur (Health & Saf. Code, § 38562, subd. (d)(2));

13. ***Complement direct measures*** – to ensure, if applicable, that the GHG emissions reduction from a market-based compliance mechanism occurs over the same time period and is equivalent in amount to any direct emissions reduction required pursuant to AB 32 (Health & Saf. Code, § 38562, subd. (d)(3));

14. ***Consider emissions impacts*** -- to consider, to the extent feasible, the potential for direct, indirect, and cumulative emissions impacts from a market-based compliance mechanism, including localized impacts in communities that are already adversely impacted by air pollution (Health & Saf. Code, § 38570, subd. (b)(1));

15. ***Prevent increases in other emissions*** -- to design, to the extent feasible, any market-based compliance mechanism to prevent any increase in the emissions of criteria air pollutants or toxic air contaminants (TACs) (Health & Saf. Code, § 38570, subd. (b)(2));

16. ***Maximize co-benefits*** -- to maximize, to the extent feasible, additional environmental and economic benefits for California, as appropriate (Health & Saf. Code, § 38570, subd. (b)(3)); and

17. ***Avoid duplication*** – to ensure that electricity and natural gas providers are not required to meet duplicative or inconsistent regulatory requirements (Health & Saf. Code, §§ 38501(g), 38561(a)).

The following additional project objectives are included in the Scoping Plan:

18. ***Establish declining cap*** – to establish a declining cap covering 85% of the state's GHG emissions in furtherance of California's mandate to reduce GHG emissions to 1990 levels by 2020;

19. ***Reduce fossil fuel use*** – to reduce California's reliance on fossil fuels and diversify energy sources while maintaining electric system reliability;

20. ***Link with partners*** – to link with other WCI partner programs to create a regional market system;

21. ***Design enforceable, amendable program*** – to design a program that is enforceable and that is capable of being monitored and verified; and

22. ***Ensure emissions reductions*** – to ensure that emissions reductions are real, permanent, quantifiable, verifiable and enforceable.

D. Cap-and-Trade Regulation Overview

Under AB 32, California must reduce greenhouse gas (GHG) emissions to 1990 levels by 2020. Cap-and-trade is one of the key measures that California will employ to reduce emissions and drive long-term investment in cleaner and more efficient technologies to power the state's economy. As proposed here, the cap-and-trade program would establish a firm cap covering about 85 percent of the State's GHG emissions and allow trading of allowances to ensure cost-effective emissions reductions.

The cap-and-trade program will cover the major sources of GHG emissions in the state, including refineries and power plants, industrial facilities and transportation fuels. The program will impose an enforceable emissions cap beginning in 2012 that will steadily decline over time. The State will distribute allowances, which are tradable permits, equal to the cap. Sources under the cap will need to turn in allowances equal to their emissions at the end of each compliance period. Sources that aggressively reduce their emissions can trade their surplus allowances to firms who find it more expensive to reduce their emissions. In the early stage of the program, most allowances will be distributed for free to provide a smooth transition into the program, allowing those covered by the program to focus on investing in emission reductions and cleaner technologies, and limiting any concerns about competitiveness and emissions leakage.

Under the cap-and-trade program, offset credits can be used by covered entities to meet a portion of their compliance obligation. An offset is a credit that represents a reduction of greenhouse gases resulting from an activity that can be measured, quantified, and verified. Each offset credit represents a specific quantity of emission reductions from a source not directly covered by the cap-and-trade program.

Implementation and enforcement of the cap-and-trade program will be key in ensuring that California meets it AB 32 goals. The proposed regulation includes strict rules for reporting emissions and trades, with substantial penalties for violations. Transparency in the trading process is important to avoid market volatility and manipulation.

This section provides a high-level overview of the elements of the proposed cap-and-trade program. Each design element is discussed in more detail later in this chapter.

1. Cap-and-Trade

In the proposed program, a limit, or cap, is put on the amount of GHGs that can be emitted by all covered sectors. The total number of allowances created is equal to the cap set for cumulative emissions from all the covered sectors. In addition to allowances, credits for a limited amount of emissions reductions from sources that are outside the cap coverage, called *offsets*, will be allowed for compliance. The use of offsets will allow emissions in the capped sectors to slightly exceed the allowances issued, though these additional emissions from capped sectors will be matched by emission reductions that result from offset projects. The term *compliance instrument* covers both allowances and offsets. These compliance instruments may be traded among entities. At the end of each three year *compliance period*,[3] covered entities are required to turn in, or *surrender*, enough compliance instruments to match their emissions during this time period. Each allowance equals one metric ton of carbon dioxide equivalent. Since the program includes some GHGs (e.g., methane) that are more effective at trapping heat than carbon dioxide, all emissions are measured in units relative to the heat trapping potential of carbon dioxide or CO_2e, the “e” standing for “equivalent”.

The cap-and-trade program puts a price on emitting carbon. This price provides incentives for GHG emission reductions and innovation. It can stimulate reductions for all covered sectors without requiring individual regulations for all GHG emissions. Pricing carbon in this way ultimately creates a market for finding the most cost-effective emission reductions. Providing entities the flexibility to find the most cost-effective reductions lowers the overall cost of the program. Creating a market provides more flexibility than direct regulation can and provides incentives that can spur local investment and the use of green technologies.

2. Fundamental Elements of the Cap-and-Trade Program

The following elements constitute the basic components of the proposed cap-and-trade program.

[3] A compliance period is the length of time for which covered entities must submit compliance instruments equal to their verified emissions.

Scope

The proposed regulation phases sectors into the program. Under this phased approach, entities in the following sectors will be covered in the program according to the following timelines:

Starting in 2012 (first compliance period):

- Electricity generation, including electricity imported from outside California; and
- Large industrial sources with GHG emissions at or above 25,000 metric tons of carbon dioxide equivalent ($MTCO_2e$).

Starting in 2015 (the second compliance period), the program expands to include fuel distributors in order to cover emissions associated with:

- Combustion of gasoline, diesel, natural gas, and propane from sources with emissions below 25,000 $MTCO_2e$, including all commercial, residential, and small industrial sources; and
- Fuels used for transportation.

All sectors listed above will be covered through 2020.

The Cap

The limit on GHG emissions—the cap—is a critical part of the cap-and-trade program design because it determines the number of total allowances ARB issues. The cap is set in the proposed regulation and consists of annual cap numbers, also referred to as "budgets." Staff included annual numbers through 2020 in the proposed regulation to allow entities that have a compliance obligation to know how many allowances will be available from 2012 through 2020.

The initial cap level in 2012 will be set at the level of emissions expected from covered sources for that year – at 165.8 million $MTCO_2e$ ($MMTCO_2e$). The cap then declines in starting in 2013 until 2015. In 2015 the cap will be expanded to include GHG emissions from fuel suppliers. This expansion is based on the level of GHG emissions expected from the covered fuels for the year 2015, resulting in a cap for 2015 of 394.4 $MMTCO_2e$. The cap will then continue to decline from 2015 to 2020.

The level of the cap is critical to the environmental effectiveness of the cap-and-trade program. If the cap is not set at a stringent enough level to drive GHG emission reduction activities, the environmental goals of the program may not be met even if all sources comply with program requirements. Staff has designed the program to be sufficiently stringent to spur GHG emission reductions to achieve AB 32 goals. Staff has set the cap for 2020 at 334 $MMTCO_2e$, which is designed to allow California to achieve the AB 32 target in 2020.

Allowances

As discussed previously, an allowance is equal to one metric ton of CO_2e. ARB will issue a total of approximately 2.7 billion allowances for the cap-and-trade program through the year 2020. Annual allowance budgets for calendar years 2012–2020 are established in the proposed regulation, so that the total number of allowances issued in each year through 2020 are known. At the end of a compliance period, each covered entity is required to surrender allowances (and if it elects, a limited amount of offsets) equal to its total GHG emissions during that compliance period. ARB will also require entities to surrender compliance instruments to match a portion of their reported emissions each year during the three-year compliance period to reduce the risk of non-compliance at the end of the three year period. When compliance instruments are surrendered, ARB will permanently retire them.

Covered entities are not the only entities that may hold and trade allowances in the program. Entities in covered sectors with emissions less than 25,000 $MTCO_2e$ may voluntarily elect to become covered entities. Other non-covered entities may be eligible to participate voluntarily. Some examples of these non-covered entities include financial institutions or brokers, offset developers, and those who may want to obtain and voluntarily retire allowances. Once an entity holds an allowance, it can: 1) surrender it to comply with an obligation under the regulation: 2) bank it for future use; 3) trade it to another entity; or 4) ask ARB to retire it.

Staff proposes to create a gradual transition into the program through the design of the allocation system. ARB will rely primarily on free allocation at the start of the program to minimize near-term costs to California consumers and businesses and to minimize emissions leakage. The allocation design will reward those who have invested in energy efficiency and GHG emission reductions and will encourage continued investment in clean and efficient technologies in the future.

The outset of the program will include a small direct auction that includes a consignment feature for allowances allocated to electricity distribution utilities. Staff designed an auction program that will allow for broad participation by diverse market players and minimize the chances for manipulation. The auction is set up in a way to ensure that allowances go to those market participants that place the highest value on them.

Cost Containment Mechanisms

The proposed cap-and-trade program includes a number of mechanisms designed to minimize the costs of reducing GHGs without compromising the environmental integrity of the program. Some of the mechanisms that staff proposes in the cap-and-trade regulation are three-year compliance periods, banking, offsets, the Allowance Price Containment Reserve, and linkage to other trading systems.

Three-year Compliance Period

A number of significant sources of California emissions are subject to significant year-to-year variations – for example, electricity sector emissions increase in low water years as lower hydropower production is replaced with natural gas generation. For this

reason, the proposed program has been designed with a three-year compliance cycle to help smooth out these annual variations, and to provide sources with greater flexibility to reduce emissions.

Banking

In a cap-and-trade program, banking allows participants to hold spare allowances and use them for compliance in a later period. The ability to bank allowances provides an incentive for covered entities to make early reductions since the declining cap could push allowance prices higher over time. Staff proposes to allow banking of allowances without restriction.

Offset Credits

Under the proposed program, covered entities may use offset credits to satisfy a portion of their compliance obligation. In addition to providing compliance flexibility, the inclusion of offsets in the program will support the development of innovative projects and technologies from sources outside capped sectors that can play a key role in reducing emissions both inside and outside California.

Offsets must meet rigorous criteria that demonstrate that the emissions reductions are real, permanent, verifiable, enforceable, and quantifiable. To be credited as an offset, the action or project must also be additional to what is required by law or regulation or would otherwise have occurred. Under the program, ARB will issue or recognize an offset credit that could be used by a covered entity instead of turning in an allowance for the equivalent amount of CO_2e emitted.

The proposed program imposes a limit on the amount of offsets that an individual covered entity can use for compliance. Allowing a limited number of offsets into the program provides benefits and ensures that some GHG emission reductions occur within the sectors covered by the cap-and-trade program. The proposed program includes provisions that would allow a maximum of 232 million $MTCO_2e$ of offsets through the year 2020. This limit will be enforced through a limit on the use of offsets by an individual entity equal to eight percent of its compliance obligation. Combined with the Allowance Price Containment Reserve, this limit ensures that a majority of reductions from the program come from sources covered by the program at expected allowance prices, while use of the reserve will relax that constraint if prices rise.

Allowance Price Containment Reserve

Staff proposes to establish an Allowance Price Containment Reserve (the Reserve). The Reserve is an account that is filled with a specified number of allowances removed from the overall cap at the beginning of the program. Covered entities may purchase reserve allowances at specified prices during direct quarterly sales. Covered entities gain flexibility through access to the Reserve if prices are high or entities expect prices to be high in the future. Staff proposes the Reserve be filled with 121 million allowances out of the total of approximately 2.7 billion issued for the years 2012 to 2020.

To ensure that allowance prices do not get too low to stimulate emission reductions, the proposed regulation establishes a price floor at the auction of $10 per ton. Allowances that are unsold at auction will be added to the Reserve. This may happen if not all allowances are sold at the price floor of $10.

Linkage to Other Greenhouse Gas Emissions Trading Systems

Linkage is the reciprocal acceptance of compliance instruments issued by another system. California could decide to link its cap-and-trade program to other emissions trading systems of similar scope and rigor, and has been working with our WCI partners to create the framework for a regional system of linked programs. Linkage can expand the coverage of the cap-and-trade program to include emission reduction opportunities for sources covered in another program. The proposed regulation establishes a framework for linkage. Each program considered for linkage would by subject to Board action, and will undergo a case-by-case analysis by staff as part of a formal rulemaking process.

Although the regulation does not propose to link to any programs at this time, four programs are candidates for linkage before the 2012 start date. Currently four other WCI partners are working to implement cap-and-trade programs consistent with the Design for the WCI Regional Program by January 2012: New Mexico, British Columbia, Quebec, and Ontario. Linking to WCI partners has several advantages for California. The reduction of GHG emissions that can be achieved collectively by the WCI partner jurisdictions are approximately double what can be achieved through a California-only program. The broad scope of a WCI-wide market will provide additional opportunities for reduction of emissions, therefore providing greater market liquidity and more stable carbon prices within the program.

California and other WCI partners have also been participating in the Three Regions collaborative process with representatives from the jurisdictions in the Regional Greenhouse Gas Initiative and the Midwestern GHG Reduction Accord. The Three Regions have joined in a cooperative effort to share experiences in the design and implementation of regional cap-and-trade programs, inform federal decision making on climate change policy, and explore the potential for further collaboration among the three regional programs in the future.

Program Implementation

Assuming the design of the cap-and-trade program is approved by the Board, significant work will be needed to implement the regulation. Two primary areas that will require attention are finalizing the details of the allocation system for allowances, and designing and implementing a market tracking system. ARB staff is working closely on both efforts with our partners in the WCI, since coordinated approaches to allocation and the tracking system will simplify linking the individual programs into a regional market system. ARB staff believes that it is important for California to start its program in conjunction with our WCI partners.

Compliance and Enforcement

A robust enforcement program will play a vital role in the success of the cap-and-trade program by discouraging gaming of the system and deter and punish fraudulent activities. One allowance is needed to cover one metric ton of a covered entity's emissions, if they are turned in by the compliance deadline. If an entity does not meet the compliance deadline it will need to surrender additional allowances. Staff designed the proposed regulation to remove, to the extent possible, financial incentives for noncompliance and to make sure that every ton of GHG emitted is covered by a valid compliance instrument.

To develop the enforcement program for cap-and-trade, staff consulted with legal and enforcement staffs from state and federal agencies to gain insight in this area. These agencies included the California Environmental Protection Agency, California Attorney General's Office, the California Energy Commission, the California Public Utilities Commission, the Department of Water Resources, United States Department of Justice, the United States Securities and Exchange Commission, and the United States Commodities and Futures Trading Commission. In addition, staff consulted with academic institutions including U.C. Berkeley's Center for Law, Energy, and the Environment and legal scholars from other universities.

E. ARB Implementation Approach

1. Introduction

The cap-and-trade program is made up of many elements, must serve a large number of important objectives at the same time, and relies on the cumulative actions of a large number of participants operating in a complex market system. Accordingly, unanticipated effects and results undoubtedly could occur over the life the program. ARB therefore is committed to using an adaptive management process to review and revise policies, protocols, and procedures as more information becomes available.

Adaptive management has certain attributes of mitigation; specifically, it can "[m]inimiz[e] impacts by limiting the degree or magnitude of the action and its implementation." (Cal. Code Regs., tit. 14, § 15370, subd. (b).) In the case of the cap-and-trade program, however, ARB has chosen to integrate adaptive management into the proposed program. ARB considers adaptive management to be an element of the project design, and the FED's analysis of environmental impacts reflects the integral nature of adaptive management.

ARB will focus its early adaptive management efforts on two areas: the potential for adverse environmental impacts related to the creation or operation of forest offset projects and implementation of the Forest Offset Protocol; and the potential for localized air pollution emission increases.

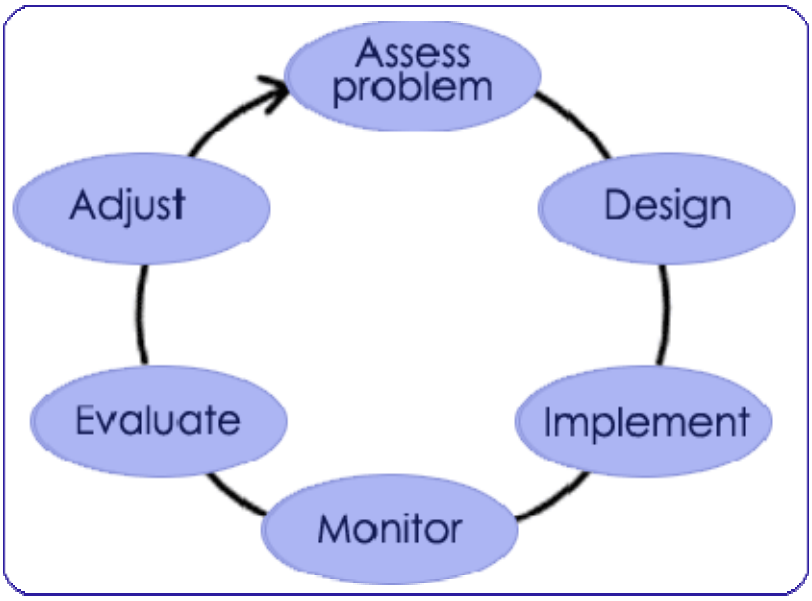
2. What is Adaptive Management?

"Adaptive management" involves a process of information gathering, review, and response. Adaptive management promotes flexible agency decision-making, allowing for adjustments as consequences become better understood (USDI 2009). Adaptive management is particularly appropriate where complex systems are involved, where the effects of an agency's decisions and actions play out over an extended time period, where the agency must meet multiple objectives and goals, and where perfect information is not available.

While the term "adaptive management" often refers to decision-making systems used in conjunction with direct resource management (for example, in deciding what forest management strategies to pursue, or whether environmental restoration projects are successful), adaptive management can also be used in conjunction with agency actions that affect, rather than directly manage, the environment (Ruhl, J.B., 1999). In the case of the cap-and-trade program, ARB intends to use adaptive management to ensure that the program provides the benefits required by AB 32 (e.g., reduction of greenhouse gases from the capped sectors and maximization of economic and environmental co-benefits) and avoids unintended adverse effects (e.g., increases in the emissions of toxic air contaminants or criteria air pollutants).

The following chart, representing the adaptive management process, shows how new information can assist in refining and adjusting agency action to continually meet its defined objective (USDI, 2010).

Figure 2-1
Adaptive Management Process



3. What are the Essential Elements of Adaptive Management?

The legislature in AB 32 already has identified the *problem* that ARB is charged with solving: ARB must put into place a set of regulations and incentives to reduce California's statewide GHG emissions to 1990 levels by 2020. The Scoping Plan sets out the framework *design* for how ARB will address statewide GHG emissions. The cap-and-trade program currently proposed is one element of that plan. The reasons for the preferred *design* for cap-and-trade are set forth throughout this document.

Once the cap-and-trade program is *implemented*, ARB will *monitor* whether, over time, the program is meeting all of the objectives set forth in AB 32 (see Health and Safety Code, §§ 38562(b), 38570(b) and discussion of Project Objectives at ES Section C). These objectives include certain beneficial outcomes that should be maximized, and also certain adverse consequences that should be minimized or avoided. Much of the monitoring information ARB will come from the data collected as a part of normal program management, such as emissions data reports from the Mandatory Reporting Regulation, allowance price and use, or offset project annual reports. To supplement these sources, and to ensure that ARB has adequate information to identify whether the objectives are being met, ARB will also obtain specified information from relevant expert sources, including the Offset Project Registries and local air districts, and solicit additional information from stakeholders, including the public.

Using the results of monitoring, ARB will regularly (at a minimum, at least once every three-year compliance period) *evaluate* whether the objectives identified by statute are being achieved. Periodic evaluation will be coordinated with other actions and information collection occurring at during compliance periods.

ARB will conduct its evaluation sufficiently in advance of the end of each compliance period to allow ARB sufficient time to *adjust* the cap-and-trade program, if warranted, before commencement of the next compliance period. If ARB determines during its periodic review that the cap-and-trade program is not achieving the objectives as defined by AB 32, or if substantial, unanticipated adverse environmental effects are identified, ARB will revise the operation of the program accordingly.

4. Adaptive Management Focus Areas

a. Forest Offset Projects and the Implementation of the Forest Project Protocol

In the course of developing the cap-and-trade regulation, some commenters have expressed concerns related to the Forest Offset Protocol implementation. These include: concerns related to the possibility that the assumptions embedded in the protocol will prove to be in error (e.g., assumptions related to carbon releases from soil disturbance); and concerns related to how availability of offsets might change forest practices in an unforeseen, unexpected and environmentally harmful way (e.g., by creating incentives for less environmentally conservative management practices).

Based on the available data and current law and policies that regulate forest activities, ARB concludes that, while substantial impacts from forest project-related impacts attributable to the cap-and-trade program are unlikely, there is at least a possibility that such unintended impacts could occur. Accordingly, ARB will implement adaptive management.

Specifically, under the Forest Offset Protocol, detailed information about each forest offset project must be submitted to ARB. This includes information about annual GHG reductions or removal enhancements, and any GHG reversals (e.g., from wildfire or unintentional losses from activities such as over-harvesting). ARB will post these annual reports, in full or in summary form, on its website or otherwise make the reports or a summary of the reports publicly available. In addition, ARB will periodically solicit comments from the public and stakeholders, including in-state and out-of state resource management agencies with jurisdiction over forest offset projects.

This reported and solicited information will become part of ARB's periodic review of the cap-and-trade program. This review will include an opportunity for public review and comment.

If unanticipated adverse environmental effects are identified during this periodic review and they are substantial enough to interfere with or undermine the achievement of the objectives for the cap-and-trade program as defined by AB 32, including the objectives set forth in 38562(b) and 38570(b), ARB commits to promptly developing and implementing appropriate responses, including revising the Forest Offset Protocol accordingly.

Potential responses ARB would consider, if warranted, include, but are not limited to, revising the types and/or geographic location of forest offset projects that are eligible under the Forest Project Protocol, or disallowing use of certain types of forest offset credits. These potential future responses are not, however, warranted based on currently available information, and, accordingly, their imposition today would not be supported by substantial evidence and would unnecessarily conflict with AB 32's other objectives.

b. Localized Air Quality Impacts

During the development of the cap-and-trade regulation, some commenters have expressed concern that the flexibility inherent in a cap-and-trade program could induce some industrial facilities to increase criteria pollutant and/or toxic air emissions, disproportionately affecting some local communities.

Based on the available data and current law and policies that control localized air pollution, and expected compliance responses to the cap-and-trade regulation, ARB concludes that, increases in localized air pollution, including toxic air contaminants and criteria air pollutants, attributable to the cap-and-trade program are extremely unlikely. ARB cannot, however, say that increases would never occur, and that any such increases would never have implications for public health. ARB seeks to ensure that

the cap-and-trade program, as it operates over time, avoids and minimizes all instances of localized air quality impacts. Accordingly, ARB will implement adaptive management.

ARB already receives annual GHG emission information from covered sources. The regulation will also require the submittal of compliance instruments, allowances and offsets, to meet a portion of an entity's annual emissions each year, and the submittal of compliance instruments to meet all emissions during a compliance period at the end of each compliance period. ARB will also receive information from the Industrial Energy Efficiency Audit regulation in 2012, and solicit information about new and modified permits for covered entities from local air districts. ARB will evaluate the data both against previous years' data and at the end of each compliance period to determine whether there are any disproportionate impacts to low-income communities (Health and Safety Code, § 38562(b)(2)) or any increases in the emissions of toxic air contaminants or criteria air pollutants (Health and Safety Code, § 38570(b)(2)). ARB will consult and coordinate with local air districts, as appropriate and necessary, in these evaluations.

ARB will post GHG emission information, as well as each entity's submission of allowances and offsets for compliance, on its website or otherwise make this information publicly available. In addition, ARB will solicit comments from the public and stakeholders. This reported and solicited information will become part of ARB's periodic review of the cap-and-trade program. This review will include an opportunity for public review and comment.

If unanticipated adverse localized air quality impacts are identified during this periodic review and they are substantial enough to interfere with or undermine the achievement of the objectives for the cap-and-trade program as defined by AB 32, including the objectives set forth in 38562(b) and 38570(b), ARB commits to promptly developing and implementing appropriate responses.

Potential responses ARB would consider, if warranted, include, but are not limited to, using allowance value to fund construction of local mitigation projects that eliminate localized air impacts (e.g., funding the purchase of low-emission buses or fleet upgrades); providing incentives for energy efficiency and other emission reduction activities within the community; or instituting more stringent requirements for compliance responses in specifically identified, impacted communities (e.g., restricting trading). These potential future responses are not, however, warranted based on currently available information, and, accordingly, their imposition today would not be supported by substantial evidence and would unnecessarily conflict with AB 32's other objectives.

5. Additional Monitoring Areas

a. Achieving the Greenhouse Gas Limit

At its core, the cap-and-trade regulation sets a limit on greenhouse gas emissions. ARB ensures that the cap is met by distributing a limited number of allowances to emit greenhouse gases. At the end of each three-year compliance period, ARB will determine whether the limit has been met by examining whether the number of

compliance instruments turned in by covered entities matches the emissions reported under the Mandatory Reporting Regulation plus the allowable number of offsets. ARB will post the results of its evaluation on its website or otherwise make this information publicly available.

The regulation already includes provisions entities that do not meet their compliance obligation by the deadline to turn in additional allowances, and the potential for enforcement actions against covered entities that do not meet their obligations. If these mechanisms are not sufficient to ensure that the cap is met, ARB will re-evaluate the regulation to strengthen these provisions.

ARB will also monitor both the price that is bid to purchase allowances at the quarterly auctions as well as the price at which allowances are bought and sold on the secondary market to determine whether the market is functioning as expected. Monitoring the price and the status of bids for allowances in the Allowance Price Containment Reserve will also help alert ARB staff to price increases, and the need to determine whether these increases are due to legitimate unforeseen events or market manipulation.

b. Detecting Market Manipulation

ARB has collaborated closely with staff at many agencies to craft regulatory requirements that will provide the means to identify and ultimately prevent market manipulation. However, as with any regulation, we cannot guarantee that all regulated parties will abide by the letter and the spirit of regulatory requirements. Because of this, the regulation proposes registration of all market participants to ensure third-party participants can be vetted, as well as disclosure of affiliates and for whom allowances are owned ("beneficial holdings") to help identify potential collusion or other forms of market manipulation. If market manipulation or other illicit activities are detected, ARB will work with the appropriate authorities to initiate enforcement activity and, if necessary, re-evaluate regulatory requirements to avoid future incidents.

c. Avoiding Unintended Consequences

ARB has designed the regulation to avoid unintended consequences. However, given the complexity of the program, it is important to incorporate systems to monitor and evaluate the performance of the cap-and-trade program. ARB proposes to monitor emission leakage, the generation and use of offsets, and the potential for emission increases to ensure that the program continues to meet the diverse objectives described in Health and Safety Code sections 38562(b) and 38570(b) over time.

d. Leakage

Evaluation of greenhouse gas emission leakage is currently uncertain because limited information is publicly available to analyze the ability of sectors to pass through a carbon cost. Although ARB has designed the regulation to place covered entities on equal footing with their non-covered competitors (both those that are out-of-state, and those that are below the 25,000 metric ton compliance threshold), ARB is committed to monitor how covered sectors address carbon costs once the program is in place. The

focus of this monitoring will be whether industries in a sector increases their product price in response to the carbon cost, whether or not the price increase (or inability to increase the price) led to a change in market share for the covered sources, and the relative share of the California market served by in-state production and by imports. ARB staff will also work with covered sources and other interested parties to identify additional sources of information at the state level that could improve our ability to monitor leakage. should ARB find that leakage is occurring despite the safeguards in the regulation, ARB will examine mechanisms to address leakage, including border adjustments or changes to the allowance distribution system.

e. Offset Projects

The regulation proposes a robust monitoring program for offset projects – both the verification that the offsets are real, additional, and enforceable, and that offset project operators, verifiers, and Offset Project Registries are operating according to regulatory requirements. Offset Project Registries are required to conduct oversight of their registry program and randomly audit verifications to ensure that ARB regulatory requirements are being met by Offset Project Operators and verification bodies. ARB will have a rigorous oversight of its approved Offset Project Registries. Each year, the Offset Project Registries will provide ARB with a report providing basic information related to any offset project listed using a Compliance Offset Protocol and any findings related to verification audits. ARB will make this report publicly available on the agency's website. The Offset Project Registries will be required to provide any information related to an offset project when requested by ARB as part of its oversight of the Offset Project Registry. During the course of an offset project, the Offset Project Registry will track and report any guidance or information provided to an Offset Project Operator related to a compliance offset project to ARB every month. This will ensure that ARB understands any issues or concerns related to its compliance offset program as Offset Project Operators are implementing the actual offset projects.

In addition, the ARB regulatory offset verification program is designed to provide a transparent process by which ARB can review verification documents and fully understand any findings uncovered during the course of verification of an offset project by an ARB accredited verification body. ARB will also develop an audit and oversight program for offset project verifications.

f. Offset Protocols

Offset protocols include several elements to support existing health and environmental protection measures. Specifically, each individual offset protocol requires all offset projects to be developed in compliance with all federal, state, and local laws, regulations, ordinances, and any other legal mandate, including all CEQA and NEPA requirements where applicable. The Offset Project Operator is required to attest to ARB that their project meets these requirements. If during verification, it is found that the offset project does not meet any of these requirements, the project is ineligible to be issued ARB offset credit until the project is in compliance. In addition to regulatory compliance, during project listing, offset project operators must provide detailed

information regarding the project which would be posted on the internet and available for public review.

Because of the possibility that forest projects could unintentionally "reverse," negating the benefits of those projects because of fire, pest infestation, or disease, ARB is requiring the creation and maintenance of a Forest Buffer Account to be populated by a percentage of ARB-issued Offset Credits from forest offset projects. ARB will regularly monitor the number of Offset Credits in this Buffer Account to ensure it is sufficient to offset unintentional reversals. If the Buffer Account is found to be insufficient, ARB will revisit the contribution required by forest offset projects to this Account.

Even with these safeguards, ARB recognizes that there could be unanticipated impacts from offset projects. ARB will monitor and assess offset project documentation and potential impacts from offset project implementation at a minimum of once each compliance period. In the event that unintended impacts are identified during this review and they are substantial enough to interfere with or undermine the achievement of the objectives for the cap-and-trade program as defined by AB 32, including the objectives set forth in 38562(b) and 38570(b), ARB would develop and implement appropriate responses to rectify identified health or environmental effects. Potential responses ARB would consider, if warranted, include, but are not limited to revising the types and/or geographic location of offset projects and disallowing the use of some types of offset credits. These potential future responses are not, however, warranted based on currently available information, and their imposition today would unnecessarily conflict with AB 32's other objectives. Monitoring of the implementation of the Forest Offset Protocol related to biological impacts is further discussed in Section 4.F.5.

g. Emission Increases

Not all emissions increases at facilities covered by the cap-and-trade program will result from the program itself. The cap-and-trade program will place a new regulatory requirement and a new cost on GHG emissions from all covered facilities, so that the program provides an incentive to minimize increases or to decrease GHG emissions and any related emissions of criteria or toxic emissions. While the program provides flexibility that could allow increased production due to economic growth, such increases would not be caused by the cap-and-trade program. Only in very limited circumstances would a localized emissions increase be the actual result of the incentives created by the cap-and-trade program – e.g. shifting of production within a company from an inefficient facility with higher compliance costs to a more efficient facility that results in higher emissions at the more efficient facility.

ARB's analysis indicates that the cap-and-trade regulation is expected to have a beneficial impact on air emissions – reducing emissions of criteria pollutants and toxics. Based on the available data, current law and policies that control industrial sources of air pollution, and expected compliance responses, ARB believes that emission increases, at the statewide, regional, or local level, due to the regulation are extremely unlikely at best. Nevertheless, ARB is committed to monitoring the implementation of

the cap-and-trade regulation to identify any situations where the cap-and-trade program has led to an increase in criteria pollutant or toxic emissions.

At least once each compliance period, ARB will use information collected through the mandatory reporting regulation, the cap-and-trade regulation, the industrial efficiency audit, and other sources to evaluate how facilities are complying with the cap-and-trade regulation. ARB will also solicit information from local air districts regarding permit modifications and new permit applications for covered sources. This information will be used to identify compliance activities that could lead to increased emissions and to determine whether further investigation of potential criteria pollutant and toxic emissions is warranted.

If unanticipated adverse localized emission impacts that can be attributed to the cap-and-trade regulation are identified during this periodic review, ARB will consider whether these impacts affect the achievement of the program objectives. If so, ARB will promptly develop and implement appropriate responses. Potential responses ARB would consider include, but are not limited to, using allowance value from the cap-and-trade program to mitigate localized emission increases, providing incentives for energy efficiency and other emission reduction activities within the community, or restricting trading or prohibiting certain compliance responses in specifically identified communities. These potential future responses are not, however, warranted based on currently available information, and their imposition today would unnecessarily conflict with AB 32's other objectives.

F. Covered Entities Overview

This section presents an overview of the covered entities including a description of the basic processes and emissions that would be subject to regulation under the cap-and-trade regulation, an estimate of the number and/or size of facilities and/or emissions in California, and a discussion of the reasonably foreseeable compliance actions that may be implemented to achieve compliance.

The number of entities and facilities that would be subject to cap-and-trade is estimated to include 360 businesses representing 600 facilities. The true number of entities at any given time is subject to continual change as new facilities open while existing facilities expand or reduce their operations. The distribution of industrial facilities in California that have reported GHG emissions greater than 25,000 $MTCO_2e$ and would be subject to the cap-and-trade regulation is shown in Figure 2-2. Fuel distributors and first jurisdictional deliverers of electricity are also subject to the regulation.

1. Cement Production

a. Synopsis of Cement Production

Basic Processes

Cement manufacturing facilities prepare, combine, and process ingredient materials to produce cement. The common ingredients in cement are limestone, silica, aluminates, and ferric minerals. Minerals are largely obtained from mining. Other ingredients, like slag or fly ash are obtained from other manufacturing processes. Silica is often obtained from stream or lake dredging. The manufacturing process begins with crushing and blending the ingredients in a large ball mill. The crushed mixture is conveyed into a rotary kiln and heated. The initial heating drives off the CO_2 and dries the material. Heating at higher temperatures, approximately 2700°F, fuses the materials into "clinker." Clinker is cement in the form of rocks that are roughly two inches in diameter. Clinker is ground into a very fine powder which is sold as cement. Coal is the most common fuel used in cement manufacture, but alternative fuels are being used to augment coal at a growing number of facilities.

Number of Facilities in California

Currently, there are 11 cement manufacturing facilities in California with an estimated production capacity of about 14 million tons per year. In a good business year facilities operate at around 80 percent of capacity, producing about 11 million tons. Cement production is a function of demand. The slowed economic climate has substantially lowered demand and production in recent years. Of the 11 manufacturing facilities in the State, three are operating at severely reduced levels of production.

Emissions

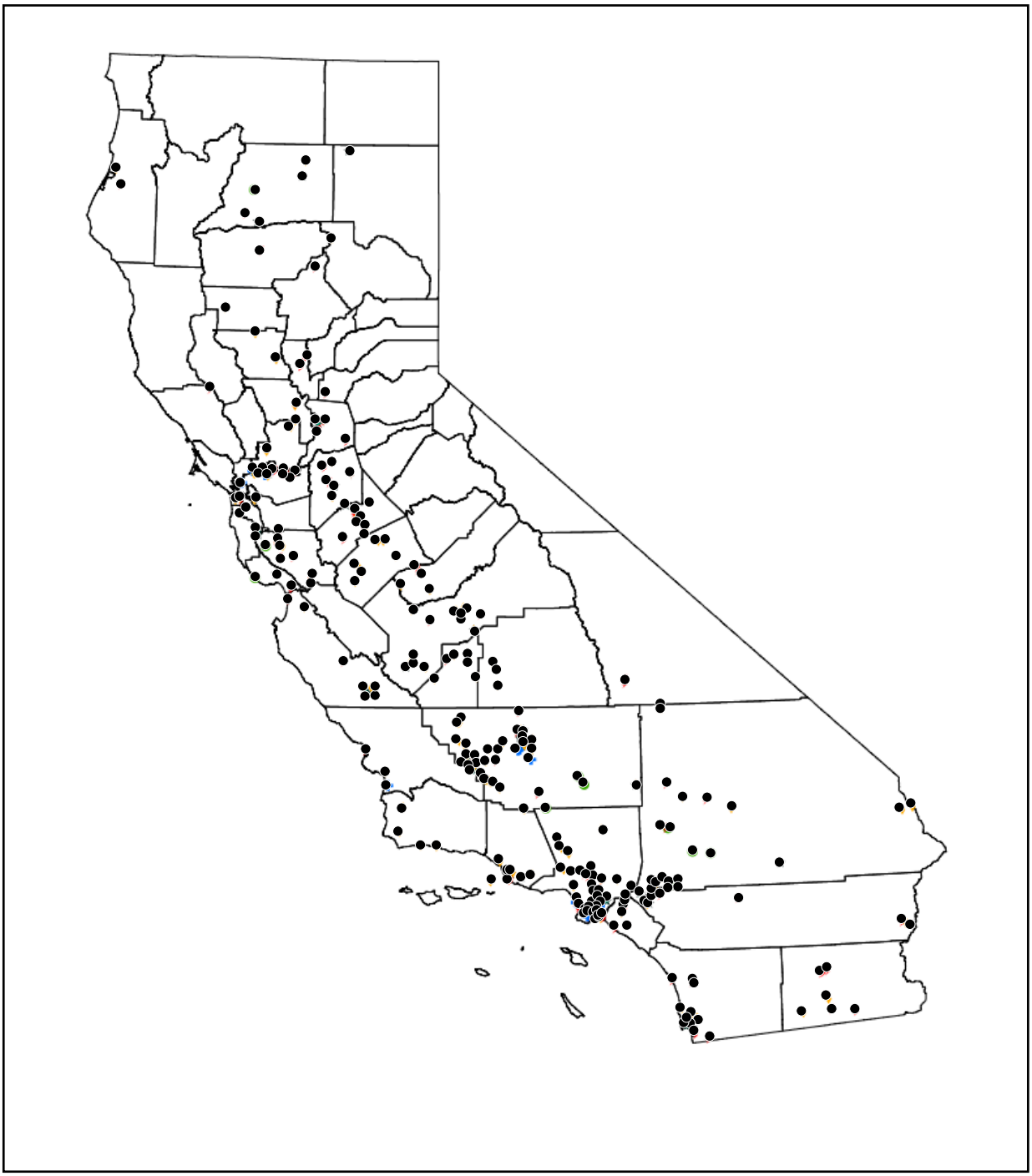
The key sources of GHG emissions in the manufacture of cement are process emissions from calcining carbonates in the kiln and emissions from the combustion of coal and/or other fossil fuels used to heat the kiln. For every ton of cement manufactured approximately one ton of CO_2 is produced. At California facilities, approximately 60 percent of the emissions originate from fuel combustion and 40 percent from calcining.

In 2006, cement manufacturing facilities in California emitted approximately 11 $MMTCO_2e$. In 2008, cement emissions decreased to an estimated 8.7 $MMTCO_2e$, presumably a reflection of decreased demand and production resulting from the slowed economy.

b. Reasonably Foreseeable Compliance Responses

The production of cement is an energy intensive process. Approximately six million British Thermal Units (BTUs) of energy are consumed to produce one ton of cement. Possible compliance responses to reduce GHG emissions include installation of energy efficiency measures to reduce fuel consumption, switching to a less carbon intensive fuel, and/or altering a process to make the production process more efficient.

Figure 2-2
Distribution of Facilities Emitting > 25,000 $MTCO_2e$



For the purposes of this environmental analysis, installation of energy efficiency measures is suggested to be the least expensive reasonably foreseeable compliance response. Installation of modern combustion facilities and kilns with improved waste heat recovery systems would reduce the amount of fuel required and therefore reduce GHG emissions from fuel combustion.

Switching to fuels with less carbon content provides an opportunity to reduce GHG emissions from fuel combustion. Coal is the primary fuel used for cement production in California, followed by incidental use of petcoke and biomass. The extremely high temperatures that must be maintained for extended periods, coupled with comparatively higher cost, precludes the use of natural gas as an alternative fuel for this purpose. Potential alternative fuels that could be suitable for cement manufacture include biomass and discarded tires, both of which have been implemented to a limited degree by some cement manufacturers. Use of biomass or tires as alternative fuels requires carefully controlled combustion conditions to minimize potentially significant adverse environmental impacts. These requirements could preclude widespread adoption of these materials as alternative fuels by the industry.

Biomass is a broad category of combustible materials including forest products (wood), municipal sewage, livestock manure, and virtually all types of fiber, plant, and similar materials. Depending on the source and type of biomass combusted, emissions can contain a variety of toxic constituents and metals. Sludge tends to be high in mercury.

Tires contain many compounds including natural and synthetic rubber, carbon black, and numerous polymers and compounds to create various tire characteristics, metals, and steel used in belted radials. The incomplete combustion of tires can produce emissions containing dioxins, furans, and metals. The portion of the emissions from the combustion of the natural rubber content is regulated as biomass in the cap-and-trade regulation. In California, one cement manufacturing facility has been recently permitted to combust a fuel mixture that allows up to 70 percent discarded tires, but has not operated under this condition for sufficient period to demonstrate that operational emissions can be satisfactorily controlled.

It is possible that increased amounts of biomass or tires could be combusted as alternative fuels by cement manufacturers in California. Considering that the use of these materials has proven to be highly controversial, it does not seem likely that manufacturers would choose to switch to these fuels while other less controversial options are available. Consequently, a significant increase in the combustion of biomass or tires is not considered a reasonably foreseeable compliance response for the cement sector at this time.

Reduction of emissions through changes to manufacturing processes as a reasonably foreseeable compliance response was evaluated. However, the cement manufacturing process provides only limited opportunities for process changes that could effectively reduce GHG emissions. A significant emissions reduction could be realized in concrete production. Cement is by far the largest ingredient in concrete, and the vast majority of

cement produced in the state is ultimately used for concrete. In a typical year, California consumes more than 14 million short tons of concrete. Pozzolans are materials that have cementitious properties when combined with calcium hydroxide, and can be substituted for cement as the binding agent in concrete. Limited amounts of pozzolans are currently mixed into various recipes for concrete. The proportion of pozzolans that can be used in concrete production depends on the type and application of the concrete. Increasing the proportion of pozzolans in concrete is a reasonably foreseeable action that could produce a greater amount of concrete to meet future demands without increasing cement manufacture and associated emissions.

Common pozzolans include fly ash which is a by-product of coal combustion and natural pozzolans which are primarily geologic materials of volcanic origin, like pumice. Some cement facilities may be able to use fly ash from their own coal combustion or obtain it from other coal-burning facilities in California. Recognizing that coal combustion is relatively limited in California, it is foreseeable that fly ash could be imported from coal-burning facilities in other states. Rail is the most obvious mode of transport. Natural pozzolans are mined at several locations in California, most notably in the Lassen region of northern California, but also from isolated formations in southern California and nearby Nevada. Considering there are about eleven cement facilities in California, and most already use pozzolans to some extent, increased use of these materials would not be expected to substantially increase, or directly cause mining operations to expand spatially or increase output beyond their permitted capacities. Trucks and rail are the most logical forms of transport. The increased use of pozzolans by the eleven cement facilities in California could increase local truck trips but would not be expected to meaningfully affect rail operations.

Carbon capture and sequestration (CCS) is an emerging technology that could enable facilities to divert emissions to suitable storage or destruction processes. Underground injection into geologic formations is one of the most promising sequestration techniques. However, CCS is potentially controversial, comparatively expensive, and has yet to be recognized as a viable strategy in many situations. Consequently, CCS is not considered a reasonably foreseeable strategy to reduce CO_2 emissions from the cement industry at this time.

2. Cogeneration (Combined Heat and Power)

a. Synopsis of Cogeneration

Basic Processes

Cogeneration, commonly referred to as CHP, is the practice of operating a boiler to produce steam both to generate electricity and for applications that require indirect heat, such as warming buildings or industrial processes. The extraction of dual functions (heat and power) from the same steam is an energy efficient design that can be cost-effective in many situations. Cogeneration produces electricity and heat with up to 40 percent less fuel than required to produce the electricity and heat separately.

Number of Facilities in California

There are more than 900 CHP plants in California. Most CHP plants are too small to be subject to the cap-and-trade regulation. There are 58 stand-alone CHP plants with capacity greater than 1 megawatt (MW) that reported GHG emissions to ARB. Large cogeneration accounted for about 15 percent of peak electricity demand in California in 2007 (CEC 2007). Those plants emitted an estimated 12 $MMTCO_2e$. An additional 102 CHP plants are components of larger industrial facilities, such as refineries or hydrogen production. The cogeneration emissions from those plants are accounted for as separate entries in reports submitted under primary sectors that include GSC, electricity generation, cement plants, petroleum refineries, and hydrogen plants.

Emissions

The key source of GHG emissions in cogeneration is combustion of fossil fuels or biomass fuels to generate thermal energy and electric power. The quantity of GHG emissions therefore depends on the conversion efficiency of the equipment. Supplemental firing may be used to increase the productivity of the cogeneration system. Some independent cogeneration facilities may supply steam and/or electricity to a dedicated host facility, while some may acquire steam from a dedicated host facility. The amount of GHG emissions produced by a cogeneration facility may vary depending on whether steam is acquired off-site and on the amount and type of fuel consumed by the cogeneration system.

b. Reasonably Foreseeable Compliance Responses

Energy efficiency measures for combustion include improving heat containment in the combustion chamber by closing leaks, increasing combustion efficiency and reducing fuel use, and switching to improved fuels. Additional discussion of fuel combustion and GHG emissions is presented under the “Stationary Combustion” covered entity in this section.

3. Glass Production

a. Synopsis of Glass Production

Basic Processes

Glass manufacturers produce glass for a variety of residential, commercial, institutional, and industrial purposes. Although the manufacturing process is essentially the same, various types of glass contain differing ingredients that are added to enhance glass color, temperature durability, strength, etc. The most common substances in glass are silica, sodium bicarbonate or potash, and lime. These naturally occurring substances are readily available throughout most of North America. In the glass manufacturing process, the silica, soda, and lime are placed in a melting furnace with a temperature of approximately 2,500°F for as long as 24 hours. Fragments of recovered glass, called cullet, are added to the melting furnace for recycling. Following melting, the molten glass is cooled several hundred degrees to a temperature that allows it to be worked into the desired form. Finally, the formed glass is placed in a ‘lehr’ oven which regulates cooling to increase the uniformity and strength of the glass. Fiberglass and textile fibers

are created by specialized cooling and finishing processes. Fiberglass manufacturing accounts for the least emissions of all glass manufacturing, in large part due to heavy reliance on electricity rather than fossil fuels.

The California Beverage Container Recycling and Litter Reduction Act of 1986 and Fiberglass Recycled Content Act of 1991 require glass container manufacturers in California to use at least 35 percent cullet in their products and fiberglass manufacturers to use at least 30 percent cullet in their products, respectively.

Number of Facilities in California

The Economic Census of 2007 identifies six flat glass manufacturing; 84 pressed/ blown glass; and 7 glass container manufacturing facilities in California. An additional 200 facilities manufacture products from purchased glass. Glass manufacturing facilities are either equipped with continuous or batch glass melting furnaces, with the latter type generating emissions below the 25,000 $MTCO_2e$ threshold. Facilities in this sector were not required to report their process emissions under ARB's mandatory reporting rule in 2009, but under a proposed revision to the mandatory reporting regulation would report both combustion and process emissions starting in 2012. In 2008, eleven combined glass manufacturing facilities surpassing the reporting threshold emitted approximately 641,000 $MTCO_2e$ from stationary combustion activities.

Emissions

Glass manufacturing facilities emit CO_2, N_2O, and CH_4 with major sources being fuel combustion and the volatilization of raw materials (i.e., process emissions). Glass melting furnaces need vast amounts of energy to heat and melt raw materials to form molten glass. Raw materials processed during glass manufacturing include carbonates such as limestone and dolomite, that when heated, liberate CO_2 as process emissions.

Natural gas is the primary fuel used in glass manufacturing (i.e., 78 percent of energy input) (MECS 2006). It is used primarily for the melting and annealing processes. Electricity may be used as booster energy for melting tanks and for lights, fans, pumps, compressed air systems, forming equipment, etc. Some specialty manufacturers, such as fiberglass finishing, may use only electricity.

b. Reasonably Foreseeable Compliance Responses

Combustion emissions represent 90 percent of the GHG emissions attributed to glass manufacturing. The most likely methods to reduce GHG emissions from glass manufacturing are energy efficiency measures that reduce fuel use. Maximizing cullet use and optimizing the melting operation are the most promising methods to reduce fuel consumption. Manufacturing new glass from existing glass (cullet) requires significantly less energy than production from raw materials and produces fewer direct process emissions. Heating the furnace to melt materials is the primary use of energy in glass manufacturing. Preheating cullet with waste heat from the primary furnace reduces the fuel required to melt the material in the primary furnace. The efficiency of existing furnaces and kilns can be increased through the installation of various improvements including such measures as new control systems, reducing air leaks, adjustable speed

fans, use of waste heat, or full replacement of aging furnaces with modern systems. Fuel switching to use oxy-fuel reduces fuel emissions by introducing pure oxygen to achieve hotter temperatures using less natural gas.

4. Hydrogen Production

a. Synopsis of Hydrogen Production

Basic Processes

Nearly all of the hydrogen consumed in the U.S. is for petroleum and chemical refining, as a reducing agent for metal ores, or for processing foods. Hydrogen is used to refine crude oil into lighter gas and oil products, methyl alcohol, methanol, and hydrochloric acid. One of the most significant uses of hydrogen in California is desulfurization of gas and diesel as well as petroleum cracking. Desulfurization is a major reason that California refineries are increasing hydrogen production capacity. Hydrogen is used as a food additive to hydrogenate oils and fats. Hydrogen is also used to create ammonia (NH_3) for fertilizers. Research continues to develop hydrogen as a clean transportation fuel. Processes for producing hydrogen include steam reforming from natural gas or CH_4, chemical reaction with hot coke, electrolysis of water, and the interaction of mineral acids and metals.

Hydrogen is typically produced from a natural gas feedstock through a catalyst mediated process know as steam methane reforming (SMR). The majority of the hydrogen produced in California is consumed by petroleum refineries and refinery hydrogen demand has been increasing to meet the demands of more stringent fuel requirements (lower sulfur content) and to cope with heavier crude oil supplies. Hydrogen is also a primary feedstock for the production of NH_3 and methanol.

Number of Facilities in California

There are five merchant (stand-alone) hydrogen plants in California and in 2008 these facilities reported annual emissions of 2.22 $MMTCO_2e$. Another 12 hydrogen production facilities are located at California petroleum refineries. Due to the integrated nature of refinery based hydrogen production, GHG emissions from these facilities are reported as a secondary sector within the petroleum refinery emissions report. CO_2 is the predominant GHG emitted from hydrogen production facilities, representing over 90 percent of total facility emissions. In centralized plants, the SMR process emits more than twice the CO_2 than hydrogen produced. Much of the emitted CO_2 represents carbon contained in the feedstock used to produce the hydrogen. Much smaller amounts of CH_4 and N_2O are emitted as combustion and fugitive emissions.

Emissions

Based on information from the U.S. Department of Energy (U.S. DOE), California produces approximately one-third of the 8 trillion cubic feet of hydrogen gas produced annually in the U.S., 95 percent of which is derived using SMR generally associated with petroleum refineries.

Data from the U.S. DOE, Hydrogen Analysis Center indicates that in California, hydrogen is produced either in a petroleum refinery (capacity of 1,051 million cubic feet per day in 2009) or at a nearby merchant hydrogen production facility (capacity of 845 million cubic feet per day in 2009).

b. Reasonably Foreseeable Compliance Responses

Plant efficiencies for modern hydrogen production facilities are highly optimized and typically range between 82 and 85 percent. Small reductions in GHG emissions can be achieved by maximizing the hydrogen to carbon mo NO_xide ratio of the plant feedstock. Efficiency can also be enhanced by recovering waste heat to generate electricity. One merchant hydrogen plant in California incorporates an electricity cogeneration unit that utilizes a portion of the hydrogen plant thermal energy to generate electricity, thus significantly improving the overall energy efficiency and reducing GHG emissions. Depending on the hydrogen production process and the purity of the resulting CO_2, some facilities may capture and sell their CO_2 emissions.

5. Iron and Steel Manufacturing

a. Synopsis of Iron and Steel Manufacturing

Basic Processes

There are two basic types of iron and steel mills, integrated mills and mini-mills. Integrated mills produce iron and steel from iron ore.

In an integrated mill, ore is initially melted in a blast furnace. Coke is the primary fuel used to heat the blast furnace. Coke is produced by pulverizing bituminous coal and heating the pulverized material to 3,600ºF in a sealed, airless oven for as long as 36 hours. The molten iron from the blast furnace is transferred into a basic oxygen furnace (BOF). A BOF introduces pure oxygen and reducing agents into the combustion chamber to remove specific impurities and cause the molten material to form molecular lattices with the desired properties depending on the type of steel being produced. If the molten metal is to be processed at a later time or another location, instead of transfer to the BOF, the material from the blast furnace is cooled and formed into pig iron, crude steel, basic steel, or similar products under varying names. These products are sold as iron pigs or steel ingots to manufacturers that refine the steel composition and produce rolls, sheets, cable and wire, and other forms suitable for commercial application.

Mini mills represent newer technology to produce steel. The key piece of equipment in a mini mill is an electric arc furnace (EAF). As the name implies, an EAF uses a high voltage electrical current to melt slag, ingots, scrap and recycled steel for processing. Although an EAF relies primarily on electricity to melt the varied ingredients, considerable amounts of natural gas, chemical reactions, and oxygen are required in the process to maintain a molten state and modify composition of the crude steel being produced.

As a result of the high cost to manufacture, steel is the most widely recycled material in the U.S. Recycling is more energy efficient and less expensive than producing steel from ore. As a consequence, it is estimated that nearly 83 percent of the steel produced in the U.S. had been recycled by 2008.

There are no integrated steel mills in California. Steel processing facilities in California transform steel from other sources into secondary products. Of those facilities that have reported under the mandatory reporting regulation, one facility in California uses an EAF. As noted above, an EAF relies primarily on electricity and natural gas. The remaining facilities use a cupola furnace, reheat furnace, or an annealing furnace. These furnaces are heated using coke, oil, and/or natural gas.

Iron and steel manufacturing includes a number of processes that emit GHG emissions, representing three to four percent of global man-made GHG emissions. CO_2 is the major GHG produced in steel manufacturing.

Process emissions are primarily produced during melting rather than reheating. Sources of process emissions include:

- reducing agents (e.g. coke and other additives)
- lime production (lime used as a flux agent)
- oxidation of carbon in process melts (EAF)
- consumption of carbon electrodes (EAF)
- carbon blown into EAF to make foamy slag
- use of soda ash

In addition to process emissions, CO_2 is emitted by the combustion of fuels used to heat the various furnaces operated for steel processing. Other fugitive GHG emissions include HFCs from refrigeration and cooling systems.

Number of Facilities in California

Five iron and steel manufacturing facilities reported emissions in 2008. There are no integrated steel mills in California. Of the five facilities in California, one operates a mini mill using an EAF to recycle scrap metal into concrete reinforcing bars; two use a cupola furnace; one operates a reheat furnace; and one uses an annealing furnace. Essentially, these firms process steel obtained from other sources to produce reinforcing bar, coils, wire, and pipe.

Emissions

Together the five California facilities generated 312,000 $MTCO_2e$ from combustion and from reducing iron ore with metallurgic coke.

b. Reasonably Foreseeable Compliance Responses

Individual facilities may identify different measures as most effective or appropriate for differing situations and operational requirements. Process emissions are generally regarded as an unavoidable consequence of chemical and heating processes. Significantly reducing the production of these gases would require modification of materials used and/or manufacturing processes and could be more difficult to implement than other control strategies. Using improved foaming control devices in the EAF process, or upgrading of exhaust capture and treatment devices, such as scrubbers, could be effective strategies for older facilities. Although combustion emissions are not as great as process emissions, energy efficiency improvements to improve the combustion process and reduce the amount of fuel required can contribute to overall reduction of GHG emissions intensity. Further energy efficiency improvements could include enhancing continuous production processes to reduce heat loss, and increasing recovery of waste energy and process gases to provide electricity and supplemental heat, particularly at EAF facilities.

6. Lime Manufacturing

a. Synopsis of Lime Manufacturing

Basic Processes

Lime ($CaCO_3$) is the product of calcining limestone. It is used in various industrial and other applications, including steelmaking, flue gas desulfurization at steam electric power plants, construction, water treatment, mining, precipitated calcium carbonate, and pulp and paper. The U.S. produced 19.9 million tons in 2008, of which less than 2 percent was in California. While production in 2009 reached record lows due to depressed demand in lime primary markets, production increased overall by 26 percent relative to 1990 levels.

Limestone is quarried and crushed into manageable sized particles for placement in a kiln. Limestone kilns heat the material to sufficient temperatures to drive off CO_2, leaving a material called quicklime. Quicklime is the basic form of commercially available lime. Limestone kilns are fueled with natural gas (4 percent), coal (67 percent), or other fuels such as lignite, or fuel oil (MECS 2006).

Calcination, commonly referred to as calcining, is the process of heating material to accomplish a desired change in the molecular or chemical properties of the material being heated. The process is named after the most common application, the decomposition of limestone into lime for cement manufacturing. Other common applications of calcining include the removal of water from hydrated minerals and the extraction of various chemicals or compounds from more complex ores. Calcination is accomplished in a controlled environment within furnaces or kilns where temperature, air intake, and exhaust can be regulated. The temperature within the kiln or furnace depends on the material being calcined. It is not uncommon for calination processes to require temperatures in excess of 2,500°F for many hours.

Number of Facilities in California

ARB reporting data indicates that there are three lime manufacturing facilities in California. Two of the facilities are sugar manufacturing mills.

Emissions

GHG emissions from lime manufacturing facilities arise from fuel combustion (CO_2 and, to a lesser extent, N_2O and CH_4) and process activity. Lime kilns use large amounts of energy to heat and calcine limestone. The calcination of limestone into quicklime releases the CO_2 from the limestone. National figures indicate that combustion emissions account for about 45 percent of total GHG emissions from the sector, with the remaining emissions coming from CO_2 released during processing.

The three facilities that reported in 2008 emitted a total of approximately 127,000 $MTCO_2e$ from stationary combustion activities. Combustion emissions reported by the sugar mills included various operations including lime manufacturing. Consequently, the reported emissions may overstate emissions from lime production alone. Facilities in this sector were not required to report their process emissions under the ARB mandatory reporting rule in 2009 but under proposed rule amendments would be required to report both combustion and process emissions starting in 2012.

b. Reasonably Foreseeable Compliance Responses

The release of CO_2 from carbonate materials is an unavoidable product of the calcining process. It is generally accepted that CO_2 production from this process cannot be significantly reduced. While technology advances could lead to new CO_2 applications, destruction processes, or sequestration methods, such solutions are not currently considered viable. Consequently, measures that focus on energy consumption are expected to be predominant means of reducing GHG emissions associated with lime manufacturing. These measures include the installation of more efficient equipment, improved control of industrial processes, improved heat containment by reducing leaks, and switching to improved fuels or electricity.

7. Nitric Acid Production

a. Synopsis of Nitric Acid Production

Basic Processes

HNO_3, also known as aqua fortis and spirit of nitre, is a highly corrosive and toxic strong acid. HNO_3 has many uses, the primary use being the manufacture of ammonium nitrate (NH_4NO_3) for fertilizer production. Other applications of HNO_3 include the manufacture of adipic acid, terephtahlic acid, and other organic compounds, gold and silver separation, manufacture of munitions, steel, brass pickling, photoengraving, and acidulation of phosphate rock.

Nearly all the HNO_3 produced in the U.S. is manufactured by the high-temperature catalytic oxidation of NH_3. In this process, NH_3 is flowed over a catalyst of platinum and rhodium gauze and oxidized into nitric oxide (NO). The oxidation of NH_3 is an

exothermic reaction producing temperatures of 1,380 ºF to 1650ºF. Higher catalyst temperatures produce greater amounts of NO while lower temperatures result in nitrogen (N_2) and N_2O. In a second stage, the NO produced in the initial catalytic process is cooled under pressure, reacting with oxygen to produce nitrogen dioxide (NO_2) and nitrogen tetroxide (N_2O_4). In the last stage, the NO_2 and N_2O_4 are pumped into an adsorption tower. Deionized water is blown through the tower, and the resulting interaction produces HNO_3.

The Clean Air Act's New Source Performance Standard (NSPS) Program requires the U.S. EPA to establish maximum emission rates for certain stationary sources. The existing HNO_3 production NSPS was last revised in 1984. By November 10, 2010, the U.S. EPA would determine if a revised NSPS for HNO_3 production is warranted. If so, the decision would be the first application of U.S. EPA's NSPS authority over GHGs.

Number of Facilities in California

Most HNO_3 plants in the U.S. are located in agricultural regions such as the Midwest, South Central, and Gulf States because of the high demand for fertilizer in these areas. According to U.S. EPA data, there are two HNO_3 production facilities in California: in West Sacramento and in Helm. Together, these two facilities produced about 100,000 MT of HNO_3 in 2006, or a.5 percent of U.S. production that year (U.S. EPA 2009).

Emissions

Emissions produced during the HNO_3 manufacturing process include NO, N_2O, NO_2, trace amounts of HNO_3 mist, and NH_3. HNO_3 plants are currently required to control emissions of NO.

The ARB statewide GHG inventory estimated N_2O process emissions from the two facilities to be 374,000 $MTCO_2e$ in 2006. Facilities in this sector were not required to report their process emissions under the ARB mandatory reporting rule in 2009 and the two facilities did not surpass the reporting threshold for combustion sources and hence did not report GHG emissions under that criterion. However, proposed revisions to the mandatory reporting regulation would specifically require HNO_3 manufacturing facilities to report both combustion and process emissions starting in 2012.

Emissions of N_2O from the production of HNO_3 can be reduced through the use of catalytic destruction, thermal destruction, or various N_2O recycling and utilization technologies. The HNO_3 industry controls emissions of nitrogen oxides (NO and NO_2) using non-selective catalytic reduction (NSCR) or selective catalytic reduction (SCR) technologies. In the process of destroying NO_x, NSCR systems are also very effective at destroying N_2O. The average reduction efficiency ranges from 80 to 90 percent. According to the U.S. EPA, NSCR units are not preferred in modern plants, however, because of high energy costs and associated high gas temperatures. Nationally, HNO_3 plants responsible for about 8 percent of total production use NSCR technology and the remaining 92 percent of production occurs at facilities that use SCR or extended absorption, neither of which is known to reduce N_2O emissions.

b. Reasonably Foreseeable Compliance Responses

It is not clear how HNO_3 plant operators in California would comply with requirements to reduce N_2O emissions. As noted above, NSCR is not implemented in most modern plants because of high energy costs and high gas temperatures. Without a clear alternative, as long as the price of allowances and/or offsets is less than available abatement technology, it is reasonable to expect that nitric plant operators would choose to purchase allowances or offsets rather than upgrade their plants.

8. Oil and Natural Gas Systems

a. Synopsis of Oil and Natural Gas Systems

Basic Processes

Petroleum is a naturally occurring substance which consists of a mixture of hundreds of different hydrocarbons—molecules containing hydrogen and carbon—that exist sometimes as a liquid (crude oil) and sometimes as a vapor (natural gas). Often, petroleum is extracted from geologic formations as mixed fluids containing oil, water, and gas.

The process of obtaining oil to make derivate products consists of identification of oil traps, drilling preparation, geological testing, and extraction. Geologists use various methods to detect potential oil fields. These methods may include the use of gravity meters that measure small changes in the earth's gravitational field that could indicate flowing oil, to the use of sniffers that detect hydrocarbons using sensitive electronic noses. Although modern oil-exploration methods are better than methods used in the past, they still may have only a 10 percent success rate for finding new oil fields. Once an oil trap is found, oil drilling preparation begins. The oil site is required to be surveyed to determine boundaries, and an environmental assessment may be done. Depending on the remoteness of the site, equipment may be transported by truck, helicopter or barge. Large diesel engines are typically required to power the drill rig. The major oil producing fields in California are considered "mature" producing higher viscosity oil requiring enhanced oil recovery procedures, such as CO_2, water, and steam injection, to boost production. Steam generators and process heaters can be a major source of combustion emissions, primarily CO_2 from the combustion of natural gas.

Natural gas is a combustible, fossil fuel composed of almost entirely CH_4, typically found in deep underground reservoirs formed by porous rock. Natural gas often occurs with oil which must be separated at the surface. However in California the converse is more common, i.e. natural gas often occurs in crude extracted from oil wells. The gas is separated and often used as onsite fuel at the well site.

Natural gas is used in residential, commercial and industrial applications. It is the dominant energy source used for home heating with slightly more than one half of American homes (66 million) using gas. The use of natural gas is also rapidly increasing in electric power generation and cooling. Natural gas is considered the cleanest burning fossil fuel, producing primarily CO_2, water vapor and small amounts of

NO_x. The natural gas system entails gas wells, gas processing, compressor stations, gas storage, transmission lines, distribution system, and the end users.

Processing natural gas begins by collection in wells then processed at that collection point for removal of free liquid water and natural gas condensate. The natural gas condensate may be transported to an oil refinery where the water is disposed of as waste and the raw gas is separated and piped to a processing plant where it is purified by removing acid gases, such as hydrogen sulfide (H_2S) and CO_2. Typically, natural gas extracted from California gas fields has little condensate, and most processing is performed at the extraction site or at a processing plant. The acid gases are removed by amine treating or membrane which is then routed into a sulfur recovery unit. There are many processes used for conversion. The next step in gas processing plant is to remove water vapor from gas using glycol dehydration. The dehydrator may release aromatic organic chemicals to the atmosphere. Mercury and N_2 are then removed using the adsorption process. The next step is recovering the natural gas liquid. The residue gas from natural gas liquid is the final purified sales gas which is piped to the customer or end user.

Number of Facilities in California

Thirty-eight crude oil and oil and gas producers reported stationary combustion emissions in California in 2008. According to the Department of Conservation, California production of oil and gas met 13 percent and 38 percent of the State's oil and gas demand, respectively.

Emissions

The thirty-eight crude oil and oil and gas producers reported stationary combustion emissions totaling 10 $MMTCO_2e$. These combustion emissions represent a fraction of total emissions because production related venting and fugitive emissions were not reported in 2008. CO_2 is the major GHG emitted from stationary combustion, while CH_4 is the predominant GHG found in vented and fugitive emissions from this sector. ARB is currently working with the WCI to develop reporting methodologies for the vented and fugitive sources.

b. Reasonably Foreseeable Compliance Responses

There are many technologically and economically viable means to reduce the GHG emissions that result from the extraction of oil and gas. For instance, oil producers in California have installed cogeneration facilities in production fields where steam flood enhanced oil production is practiced. The excess thermal energy from steam generation is used to produce electricity, thus significantly increasing the efficiency of production.

In the gas production and processing sectors, the U.S. EPA has published many GHG reduction strategies as part of their Natural Gas STAR and Methane to Markets programs. Projects such as the replacement of high bleed pneumatic control devices with low or no-bleed devices, and green well completions where gas that was previously vented is captured and utilized, have been demonstrated to significantly reduce GHG

emissions of CH_4. These emission mitigation projects also recover significant quantities of marketable gas and have been shown to have short pay-back periods (months to a few years).

The primary GHG gas typically associated with the oil and natural gas field operations is CH_4, a potent GHG with a global warming potential (GWP) of 25 times that of CO_2. The oil and natural gas industry accounts for almost a fourth of U.S. CH_4 emissions. However, combustion for steam generators and process heaters at California wells produces a significant amount of CO_2.

CO_2 emissions from steam generators and process boilers can be reduced through the energy efficiency compliance response that would include improved inspection and maintenance and upgrading aged equipment.

CH_4 emissions from oil and natural gas systems are primarily the result of normal operations and system disruptions. These emissions can be cost-effectively reduced by upgrading technologies or equipment and by improving operations, such as low-emission regulator valves that reduce or eliminate equipment venting or fugitive emissions. Improving management practice and operational procedures to reduce venting such as adding a leak detection and measurement program and/or adding emissions reduction technology could further reduce emissions.

9. Petroleum Refining

a. Synopsis of Petroleum Refining

Basic Processes

A petroleum refinery can include all of the processes necessary to produce gasoline, aromatics, kerosene, distillate fuel oils, residual fuel oils, lubricants, asphalt, or other products through distillation of petroleum or through redistillation, cracking, rearrangement or reforming of unfinished petroleum derivatives. California petroleum refineries process crude oil into transportation fuels, lubricants, asphalt, petroleum feedstocks, and other products through a series of energy intensive distillation, cracking, and reforming processes.

The main refining process is called simple distillation and separates crude oil into “fractions.” The crude oil is heated and sent to a distillation column where various petroleum products (i.e., the fractions, are recovered). At the lowest temperatures, light liquids such as LPG, naphtha, and “straight run” gasoline are recovered. Jet fuels, kerosene, distillates (such as home heating oils and diesel fuels) are considered middle products. Heavy products including residuum and residual fuel oil are recovered at temperatures greater than 1,000ºF.

Following crude distillation, further processing converts heavy, low-valued feedstock into lighter, higher output fuels. For example, a catalytic cracker accepts gasoil which is a heavy distillate output from crude distillation as its feedstock and produces finished distillates such as heating oil, diesel, and gasoline. A reforming unit is used to produce

higher octane products (such as various additives for gasoline) from lower-octane feedstock. Residue or residuum is the heaviest output from the distillation process and is used to produce petroleum coke.

Number of Facilities in California

The 23 refineries in California reported emissions of 35 $MMTCO_2e$ in 2008. Fifteen of the larger California refineries produce 46 to 50 million gallons of gasoline per day and typically about 55 percent of refinery capacity is devoted to gasoline production.

Emissions

Combustion of refinery gas, syngas, and petroleum coke, represents over half of refineries' GHG emissions. The remaining emissions result mainly from the use of natural gas and electricity. Additional GHG emissions are generated from the combustion of accumulated carbon during catalyst regeneration, hydrogen production via SMR, and miscellaneous activities throughout the refinery. CO_2 is the greatest GHG produced by refineries. Fuel combustion, catalytic cracking, and hydrogen production are the primary emission sources. Much of the fuel consumed in a petroleum refinery is derived from the crude oil itself. Refinery fuel gas is generated during the refining process and subsequently recovered and used as a fuel.

b. Reasonably Foreseeable Compliance Responses

Because petroleum refining requires large inputs of thermal energy, heat recovery and cogeneration of electricity can significantly improve refinery energy efficiency and reduce GHG emissions. Thus it is not surprising that twelve California petroleum refineries have installed cogeneration facilities that transform thermal energy into electricity to power processes at the refinery and, in some cases, supply their excess power to the grid.

Reduction of combustion emissions through energy efficiency improvements is a reasonably foreseeable compliance response that could reduce GHG emissions from refineries. However, each refinery is unique and the selected compliance response(s) would vary depending on individual circumstances.

Possible measures to reduce CO_2 emissions from combustion includes modernization or retrofitting combustion facilities with more efficient equipment, improving insulation, maintaining and fixing leaks both thermal and physical, or improving burner efficiency. Possible strategies to reduce emissions for compressor, blowers, and other movers would be to retrofit boilers and process heaters for improved efficiency. Possible actions to reduce CO_2 emissions from flaring include fixing steam traps, increasing efficiency of the flare gas recovery, and installing fluid catalyst cracker turbines.

CCS is an emerging technology that could significantly reduce the release of CO_2 emissions. The technology would enable facilities to capture CO_2 from their emission stream and direct it to a suitable storage or destruction process. However, as a developing technology, CCS is relatively expensive, has yet to be proven on a large scale, and is not considered a practical method to reduce CO_2 emissions at this time.

10. Pulp and Paper Manufacturing

a. Synopsis of Pulp and Paper Manufacturing

Basic Processes

The pulp and paper manufacturing covered entity applies to facilities that produce pulp either at stand-alone pulp facilities or integrated pulp and paper mills. The main processes of pulp and paper manufacturing are wood debarking and chip making, pulp manufacturing, pulp bleaching, paper manufacturing, and fiber recycling.

Pulp manufacturing begins with preparation of the raw material, notably chipping and depithing. Cellulosic pulp manufactured from raw material uses mechanical and chemical processes. The production of paper and cardboard includes mechanical, chemical, chemo-mechanical, and thermo-mechanical processes. Mechanical pulping means separating fibers with disk abrasion and billeting. The chemo-mechanical process consists of mechanical abrasion and the use of chemicals. Products such as newsprint are created using a pulp which is created with heat and mechanical processes (thermo-mechanical).

Chemical pulps are created by digesting wood through the kraft process. The kraft process breaks wood down to almost pure cellulose fibers using sodium hydroxide and sodium sulfide. These pulps are used primarily for packaging and high strength papers and boards. Total chlorine-free (TCF) bleaching is practiced in modern paper mills by using oxygen instead of chlorine (Cl_2). The TCF process allows the bleaching discharge to go through a recovery boiler for steam generation; the steam is used to generate electricity further reducing pollutant discharge. The finished pulp can be dried for shipment or used to manufacture paper on site.

Number of Facilities in California

Five pulp and paper manufacturing facilities reported their GHG emissions in 2008. This represents about a quarter of the 26 pulp, paper and paperboard mills operating in the state according to the 2007 Economic Census.

Emissions

The primary GHGs emitted by the pulp and paper manufacturing facility are CO_2 and CH_4. CO_2 is exhausted from recovery furnace and kiln systems which combust process emissions. CH_4 is in the exhaust from natural gas combustion used to heat boilers and furnaces. Combined, the five reporting facilities generated 823,000 $MTCO_2e$ from combustion activities in boilers, turbines and engines. Four of the five reporting facilities utilize cogeneration to optimize fuel use by using waste heat to produce electricity. Pulp and paper manufacturing facilities may also operate their own wastewater treatment plants, but the reported emissions did not include CH_4 emissions from this activity.

b. Reasonably Foreseeable Compliance Responses

Reduction of combustion emissions through energy efficiency improvements is a reasonably foreseeable compliance response that could reduce GHG emissions from pulp and paper plants. Possible measures to reduce CO_2 emissions from combustion includes modernization or retrofitting combustion facilities with more efficient equipment, improve insulation, maintain and fix thermal and physical leaks, and improve burner efficiency.

11. Electricity Self-Generation

a. Synopsis Electricity Self-Generation

Basic Processes

The bulk of electricity generated in California originates from four primary source types: gas-fueled power plants, nuclear power plants, and large hydroelectric dams, and renewable sources. Utilities distinguish between baseload power generation, which refers to power plants that run at least 60 or 70 percent of the time, and peakload, which is provided by facilities that generate electricity only to augment baseload during times of high demand. Natural gas, nuclear, and imported power (see next section) from coal plants form most of the baseload supply. Electricity generation would be subject to compliance requirements based on the GHG "content" of megawatt-hours (MWH) of electricity delivered to the California grid. The compliance obligation for cogeneration facilities (i.e., CHP) facilities, would be determined based on actual emissions reported.

The electricity sector in California is subject to numerous energy efficiency, conservation, and renewable energy laws and regulations, as well as requirements to encourage distributed generation. Distributed generation generally owned by electricity users, is smaller than most utility (or system) generation facilities, and is on the "customer side of the electricity meter." Increasing energy efficiency and distributed renewable generation reduces customer demand for electricity which almost always means less system power needs to be produced in fossil fuel power plants that emit CO_2.

The California Public Utilities Commission (CPUC) regulates investor-owned utilities (IOU) that supply 75 to 80 percent of the state's electricity needs, while publicly-owned utilities (POU), typically governed by local jurisdictions or elected Boards, supply the rest. State law requires the IOUs, under regulatory authority of the CPUC, to invest in energy efficiency and meet energy savings targets. POUs must also invest in energy efficiency at or above the percentage investment levels required of IOUs, and both POUs and IOUs are required to support distributed solar generation. In addition, SB 1368, establishes emission performance standards for both IOUs and POUs that prevent any new utility ownership or long term contracts for generation from plants that emit over 1,100 pounds (lb) of CO_2 per MWH.

While energy efficiency and distributed generation reduce system electricity demand, leading to reduced CO_2 emissions supplanting fossil generation with utility scale

renewable power on the "supply side" also significantly reduces CO_2 emissions. The Renewable Portfolio Standard (RPS) requires that IOUs meet 20 percent of their retail sales with eligible renewable resources, and requires POUs to run their own RPS programs. The renewable electricity standard adopted by ARB in September 2010, would require that 33 percent of the electricity consumed in California originate from eligible renewable sources by 2020.

Electricity from renewable sources including solar, wind, and geothermal sources provide increasing contributions to the electricity supply but still represent a small portion of the total electrical generation, and only geothermal is considered a baseload (continuous) generator. Nonetheless, utilities usually accept all available renewable energy in order to comply with renewable standard requirements.

Number of Facilities in California

The 2006 inventory of GHG emissions identified 195 electricity generating facilities in California. Under the California mandatory reporting requirements, approximately 100 facilities in the electricity generation source category reported emitting more than 25,000 $MTCO_2e$ in 2008. Seventeen of those also report cogeneration as secondary sector. An additional 12 facilities that reported under other industry sector categories (with GSC, cogeneration, petroleum refineries, or "other" as their primary sector designation) also indicated electricity generation as their secondary sector. Emissions from these additional facilities are accounted in their respective primary sectors.

Emissions

The key source of GHG emissions in electricity generation is combustion of fossil fuels or biomass fuels to power electricity generating equipment. Other sources of GHG emissions may include fugitive emissions from coal, oil, or natural gas storage and fugitive HFC emissions from cooling units.

The 195 electricity generating facilities identified in the 2006 inventory emitted approximately 51 $MMTCO_2e$, 86 percent of which is attributed to electricity generating facilities with fossil fuel combustion emissions greater than 25,000 $MTCO_2e$, 13 percent are biomass emissions, and 2 percent came from geothermal processes.

Some geothermal power plants also emit process GHGs from the release of naturally occurring GHGs dissolved in the geothermal steam. Geothermal facilities account for approximately 970,000 $MTCO_2e$ of emissions in California.

b. Reasonably Foreseeable Compliance Responses

GHG emissions from electricity generating facilities may be reduced by increasing the efficiency of electricity generation to require less fuel input per unit of energy output. Highly efficient combined cycle power generation technology includes a primary gas turbine(s), and uses "waste heat" from the main gas turbine(s) to produce steam, which is then used to drive a steam turbine to generate additional electricity. Some natural gas power plants may be retrofit or repowered to improve efficiency, reducing GHG emissions per MWH.

Several post-combustion CO_2 control technologies are currently being researched, including the use of solvents, solid sorbents, and membranes, but separation of CO_2 from power plant exhaust gas at large scale is technically challenging. CCS provides another option for reducing CO_2 emissions from electricity generation facilities, but this technology is still being tested and is not likely to be economically viable in the near future without government involvement or a carbon price to incentivize its commercial deployment. Neither of these two approaches is expected to play a significant role in complying with the cap-and-trade program, at least in the next decade.

The development of household appliances and systems that consume less energy are considered efficiency improvements that would occur at the consumer level. Energy conservation refers to the reduced demand for electricity which would result in less electricity being generated, producing a commensurate reduction in emissions at power plants. A portion of the reduced demand for electricity would be achieved by the introduction of energy efficient consumer products. The cap-and-trade regulation could contribute to increased energy prices, further reducing energy demand.

Finally, renewable power generation (and potentially other low-carbon sources) can supplant some fossil fuel generation and emissions. It is expected that all but the smallest utilities would be required to build and access sufficient renewable generation to supply 33 percent of the California's electricity needs. There are no current plans to require renewable generation beyond current law and regulation. Therefore, while a separate requirement for system renewable generation would complement cap-and-trade, there may be little room for additional renewable generation built as a compliance response to the cap-and-trade regulation.

12. Stationary Combustion

a. Synopsis Stationary Combustion

Basic Processes

For mandatory GHG reporting, the General Stationary Combustion (GSC) category includes facilities that are not already counted under other sectors such as cement plants, refineries, cogeneration or power plants. For the existing California reporting regulation, the 25,000 $MTCO_2e$ threshold includes both fossil fuel combustion and combustion of bio-based fuels such as landfill gas or biomass.

Number of Facilities in California

There were 210 stationary combustion facilities that reported emission in 2008. Of those, 62 facilities are included in reporting as components of larger facilities, including eleven facilities in Glass Production; five facilities in Iron and Steel Production; three facilities in Lime Manufacturing; 38 facilities in Oil and Natural Gas systems; three facilities in Petroleum Refineries; and five facilities in Pulp and Paper Manufacturing. The remaining 148 facilities are reported in the category GSC.

Emissions

In 2008, the 148 GSC facilities reported a total of 11 $MMTCO_2e$, of which 36 percent is CO_2 from biomass combustion. Among the 148 stationary combustion facilities, 74 also had electricity generation or cogeneration activities at the facility. This group includes a diverse range of economic activities including various manufacturing plants, food processing plants, landfills, water treatment plants, colleges and universities, and others.

Eighty-one facilities (or 55 percent of the 148 GSC facilities) are relatively small, producing less than 50,000 $MTCO_2e$ per year. In the 50,000 to 100,000 MT range there are about 45 facilities, or 30 percent of the total, and roughly 16 facilities (11 percent) produce between 100,000 and 250,000 $MTCO_2e$ per year. Only six GSC facilities, or 4 percent, emitted more than 250,000 $MTCO_2e$ in 2008.

b. Reasonably Foreseeable Compliance Responses

The majority of GHG emissions from these facilities are from direct fuel combustion. Therefore, continued efforts by facility operators to optimize and reduce their fuel consumption have a direct impact on reducing GHG emissions intensity. The substantial use of cogeneration operations by GSC facilities is an example of fuel use optimization in which waste heat energy is used to develop usable electrical energy. This not only reduces energy costs for the facility, but also offsets some of the need for electricity purchased from large fossil fuel power plants.

Those facilities able to incorporate the use of biofuels, such as biomass or landfill gas, into their operations are able to further reduce their fossil fuel GHG emissions. For landfills and bio-digester systems, the flaring of CH_4 substantially reduces GHG emissions by converting it to the less potent CO_2. Biogas facilities that combust the fuel to produce electricity reap even greater benefits because the CH_4 is converted to CO_2 and is also used to produce relatively clean non-fossil energy.

Energy efficiency improvements are the primary means of reducing emissions from stationary combustion facilities. Energy efficiency improvements are used to generally describe replacing aging equipment, retrofitting facilities, changing operational processes and/or procedures, changing fuels, and other actions that reduce fuel demand through more efficient combustion, increased heat production per fuel consumed, and reducing heat loss. The configuration and specific improvements installed at individual facilities would inevitably vary. Switching to less carbon-intensive or more efficient fuels can also reduce GHG emissions.

13. First Deliverers of Electricity

a. Synopsis of First Deliverers of Electricity

Basic Processes

The program covers emissions associated with both imported power and power generated in-state. The covered entity for in-state electricity generation is those who

generate electricity in-state and deliver it to the California grid. For emissions associated with imported electricity, the covered entity would be the first entity to place power onto the California grid. Electricity deliverers are responsible for deliveries of both specified and unspecified electricity delivered to the California grid. These entities include electrical distribution utilities (those that sell electricity to retail customers) and marketers (those that buy and sell in the wholesale electricity market).

The nature of electricity markets means that some of the imported electricity cannot be linked a particular power plant. Power plants must report to Federal agencies additional information that ARB would use to calculate emission factors associate with electricity from each specified power plant, (GHGs per MWH). ARB would provide emission factors for reporters to calculate and report emissions for particular categories of transactions.

Number of Facilities in California

Approximately 100 entities reported electricity imports for the 2008 data year: 31 marketers; 56 California-only retail providers; two multi-jurisdictional retail providers (service territory includes California and adjacent areas); California Department of Water Resources (DWR); and Western Area Power Administration. Based on 2008 electricity deliveries, approximately 75 percent of these entities would to be subject to the proposed cap-and-trade regulation.

Emissions

The ARB 2000-2006 statewide GHG inventory estimated that emissions from imported electricity were 49.6 $MMTCO_2e$ in 2006.

b. Reasonably Foreseeable Compliance Responses

Importers of electricity may reduce their allowance obligation by importing electricity from renewable sources. The most likely compliance response is considered to be the purchase of allowances or offsets to meet surrender obligations.

14. Suppliers of Natural Gas

a. Synopsis of Suppliers of Natural Gas

Basic Processes

Natural gas deliverers are the distribution network for natural gas liquids throughout the state. Natural gas is used (combusted) by a wide range of end users for everything from household uses, agricultural operations, and industrial and commercial applications. The cap-and-trade regulation would require that deliverers of fuels surrender allowances based on the amount of product that is delivered to end users.

Number of Facilities in California.

Currently there are seven CPUC regulated public utility gas corporations, seven publicly owned natural gas utilities, five interstate pipelines, and several non-CPUC regulated intrastate natural gas pipelines in California.

Emissions.

The core end users on CPUC regulated utilities had approximate emissions of 37.3 $MMTCO_2e$ in 2008. The core end users on publicly owned natural gas utilities had approximate emissions of 1.7 $MMTCO_2e$. The interstate pipelines and the non-CPUC regulated intrastate natural gas pipelines contribute emissions through their large volume customers. There are slight variations in consumption over the past few years that do not exhibit an obvious trend. Demand in residential usage is estimated to increase 0.3 percent per year while commercial demand is expected to remain unchanged. Residential, commercial and small industrial sources account for over 10 percent of total state GHG emissions via appliances and other stationary combustion sources.

b. Reasonably Foreseeable Compliance Responses

Strategies that could be practically implemented to reduce emission from the natural gas sector include encouraging a faster turnover of existing appliances to more efficient appliances (e.g., using "cash for clunkers" type programs) and increased use of biomethane. Surrendering allowances and/or offsets is expected to be the most likely compliance response to the cap-and-trade regulation in this covered entity category.

15. Suppliers of Transportation Fuels (Petroleum Products)

a. Synopsis Transportation Fuels (Petroleum Products)

Basic Processes

Transportation fuel deliverers are the distribution network for transportation fuels throughout the state. As a whole, transportation fuels account for almost 40 percent of all CO_2 emissions. The largest seven suppliers, representing the major refiners, account for over 90 percent of all transportation fuel supplies. The key sources of GHG emissions are the combustion of transportation fuels in motor vehicles and to a lesser extent at stationary combustion sources.

Transportation fuels covered by the cap-and-trade regulation are California gasoline, RBOB, California diesel, and oxygenates. Transportation fuels are used (combusted) by virtually everyone that operates an internal combustion engine. Rather than attempt to regulate fuel use by the vast number of end users, the fuel distribution network provides a logical and practical level at which to regulate GHG emissions resulting from the use regardless of the final consumer. The cap-and-trade regulation would require that deliverers of transportation fuels surrender allowances proportionate to the amount of product that is delivered to end users.

Number of Facilities in California

There are approximately 150 transportation fuel suppliers in California.

Emissions

According to the California Board of Equalization, fuel suppliers delivered 14.0 billion gallons of RBOB gasoline in 2009, resulting in estimated emission of 123.5 $MMTCO_2$ (5

percent decrease from 2007), 2.6 billion gallons of diesel resulting in the estimated emission of 26 million tons of CO_2 (15 percent decrease from 2007) and 0.85 billion gallons of ethanol resulting in the estimated emission of 4.8 million tons of CO_2 (5 percent decrease from 2007). All emissions are from fuel combustion by end users. The reduction of fuel consumption in 2008 is attributed to slowed economic conditions resulting in fewer vehicle miles traveled along with an increase in fuel efficiency. In 2010, the requirement for ethanol content in standard gasoline increased to 10 percent. As the higher level of ethanol content is phased-in, RBOB consumption would decrease proportionate to the increased ethanol use. Of these suppliers approximately 15-20 would produce sufficient emissions to be subject to the 25,000 $MTCO_2e$ per year threshold.

b. Reasonably Foreseeable Compliance Responses

Strategies that could practically be implemented to reduce emissions from the transportation fuel sector include the LCFS, increased vehicle fuel efficiency (Pavley regulation), improved land use planning (SB 375), and increased use of mass transit and non-motorized transportation. GHG emissions in this covered entity are produced by combustion at the consumer level. Suppliers of transportation fuels are not significant emission sources and do not produce emissions that could be reduced. As an upstream provider, transportation deliverers would likely surrender allowances and/or offsets as their compliance response.

16. Deliverers of Natural Gas Liquids

a. Synopsis of Natural Gas Liquids

Basic Processes

Deliverers of natural gas liquids are the distribution network for natural gas liquids throughout the state. Natural gas liquids (NGL), such as propane and LPG, are used (combusted) by a wide range of end users for everything from household uses, agricultural operations, and industrial and commercial applications. The fuel distribution network is therefore a logical level at which to regulate GHG emissions resulting from the use of natural gas liquids regardless of the final consumer.

Number of Facilities in California

The number of NGL producers and importers in California is unknown.

Emissions

The key sources of emissions are household use and mobile and stationary sources in manufacturing. In 2006, end user combustion of NGL deliveries emitted approximately 6.9 $MMTCO_2e$.

b. Reasonably Foreseeable Compliance Responses

The cap-and-trade regulation would require that deliverers of natural gas fuels surrender allowances based on the amount of product that is delivered to end users. Strategies that could be practically implemented to reduce emissions are limited. Limits

on outdoor barbeques, replacement of LPG mobile sources with electric vehicles, and improved appliance/combustion efficiencies may be difficult to achieve. The expected compliance response would be the surrender of allowances and/or offset credits.

17. Suppliers of Carbon Dioxide

a. Synopsis of Suppliers of Carbon Dioxide

Basic Processes

Commercial suppliers and transporters of CO_2 are involved in the sale and delivery of the gas; manufacturers are not included within this covered entity. While generally considered a waste product, there are many commercial uses for CO_2, such as:

- Beverage carbonation
- Metal fabrication
- Cleaning (e.g., in dry cleaning as a substitute for perchloroethylene [PERC])
- Solvent extraction (e.g. coffee decaffeination)
- Fire suppressant in fire extinguishers
- Pressurizing medium and propellant (e.g., aerosol food cans, target pistols, inflating life rafts)
- Spoilage retardant (e.g., packaging foods to retard oxidation during storage)
- Fumigant (e.g., grain)
- Refrigerating agent (e.g., dry ice)
- Manufacture of sodium carbonate which is used in the manufacture of glass, as a pH regulator (e.g. additive to pools), water softener or food additive (acidity regulator, anti-caking agent, stabilizer) and in various dyeing applications

High-purity CO_2 is obtained from naturally-occurring CO_2 reservoirs (none of which are located in California), extracted along with oil and gas, or recovered as a byproduct of other manufacturing activities, such as the fermentation of grain to make alcohol and the burning of limestone to make lime. It is also manufactured directly by burning carbonaceous fuels. Petroleum refineries are the primary source of the CO_2 that is commercially sold for industrial and commercial applications and consumption.

Number of Facilities in California

Petroleum refineries recover marketable quantities of CO_2 from processes such as catalyst regeneration. With the exception of refineries and hydrogen plants that produce more than 25,000 $MTCO_2e$ per year, other facilities in California do not report CO_2 that is captured and sold.

Emissions

In 2008, seven California petroleum refineries reported a total of almost 685,000 MT of CO_2 recovered and sold commercially. On average, this captured and sold CO_2 represented about three percent of the reporting refinery CO_2 emissions.

b. Reasonably Foreseeable Compliance Responses

The CO_2 Supplier covered entity does not apply to CO_2 production or emissions, but rather to the amount of CO_2 that is directed for sale as a commercial product. Businesses subject to this covered entity category would not include CO_2 manufacturers. Because suppliers and deliverers do not have control over production and do not generate significant emissions, and the proposed cap-and-trade regulation does not include fugitive emissions, the imposition of surrender allowances would require that these businesses obtain allowances or offsets to satisfy their surrender obligations.

G. Offset Program Overview

The offset provisions in the proposed regulation provide a cost-containment mechanism for the cap-and-trade program and encourage investment in emissions reduction technology in uncapped sectors. Offset credits are tradable credits that represent GHG emission reductions that occur in locations or sectors not covered by the cap-and-trade program. One offset credit is equal to one MT of GHG emissions. Covered entities can purchase offset credits generated through projects that reduce GHG emissions not covered by the cap as an alternative to decreasing their own emissions or purchasing allowances from other covered entities.

The offset protocols being considered by ARB as part of this rulemaking package are only applicable in the U.S. Offsets may involve land use decisions for projects located on federal, state, or privately-owned lands. They may involve project-specific environmental impacts on other resources. If an offset project is developed in California, any significant environmental impacts would be addressed through CEQA review of the project by the appropriate lead agency with primary approval authority over the action (such as the local government where a use permit may be required). If a federal partner is involved in formally establishing an offset in or out of California, compliance with the National Environmental Policy Act (NEPA) may be necessary. At this time, it would be speculative to attempt to identify individual offset project locations or if a federal agency would be involved.

Offsets must meet rigorous criteria that demonstrate that the emission reductions are real, permanent, verifiable, enforceable, and quantifiable. To be credited as an offset, the action or project must also be additional to what is required by law or regulation or would otherwise have occurred. Issuance of credits would occur for projects complying with the regulation and any project type specific requirements of an ARB adopted protocol, so the action would be ministerial (i.e., deemed approved if in compliance with the prescribed set of requirements in the protocol without further exercise of discretion).

The four protocols addressed in this FED are the U.S. Ozone Depleting Substances Offset Protocol, Livestock Offset Protocol, Urban Forest Offset Protocol, and the Forest Offset Protocol. An overview of the four proposed protocols and their reasonably foreseeable compliance responses are summarized in this section. Detailed descriptions of the protocols and their potential environmental impacts are presented as

separate sections in Chapter 4 of this FED. In addition, ARB may incorporate additional offset protocols into the offset program in the future. Each ARB-approved protocol is subject to Board approval in a public process and compliance with CEQA.

In the future, ARB may approve sector-based offset credits from developing countries. The proposed regulation describes a framework for allowing sector-based offset credits from developing countries. The proposed project does not include any sector crediting programs or adopt any protocols for sector-based offset credits. Sector-based crediting programs and protocols may be adopted in the future. At this time ARB cannot conduct an impact analysis, as such an analysis would be speculative and premature.

1. Synopsis of the Compliance Offset Protocol for U.S. Ozone Depleting Substances Projects

a. Basic Processes

The Compliance Offset Protocol for U.S. Ozone Depleting Substances Projects (ODS Offset Protocol) establishes the criteria for destruction of ozone depleting substances (ODS) that would be eligible for issuance of offset credits. ODS refers to a large group of chemicals known to destroy the stratospheric ozone layer when released into the atmosphere; they also have high GWP ranging from several hundred to over ten thousand times that of CO_2 (IPCC 2007). ODS have historically been used in a wide variety of applications including refrigerants, foam blowing agents, solvents, and fire suppressants. The types of ODS eligible under this protocol consist of the following:

- Refrigerants (used for industrial/commercial refrigeration, cold storage, air conditioners.)
- Eligible refrigerants: chlorofluorocarbon (CFC)-11, CFC-12, CFC-114, and CFC-115
- Foam blowing agents (used as insulation in refrigerators, buildings, air conditioners, and other appliances)
- Eligible foam blowing agents: CFC-11, CFC-12, hydrochlorofluorocarbon (HCFC)-141b, and HCFC-22

The U.S., in compliance with the Montreal Protocol, is phasing-out the production and importation of ODS. The eligible gases under this protocol have been phased out of production and importation in the U.S. for those uses. CFCs were phased-out in 1996 and the HCFCs were phased-out for foam use at the beginning of 2010. Although the eligible gases can no longer be produced or imported, the current supply of these substances may continue to be recovered, recycled, reclaimed, and reused. In addition, there are no regulations that require the recovery and proper destruction of these substances to prevent the release of ODS to the atmosphere at the end of their life cycle. For foams, these materials are shredded and disposed of at landfills, where a

portion would leak to the atmosphere. Refrigerants are expected to be recycled and eventually emitted through leakage from equipment.

Under this protocol, offset credits would be issued for destruction of ODS at an eligible destruction facility in the U.S. (i.e., a facility that has received a Resource Conservation and Recovery Act [RCRA] permit for the destruction of ODS or meets United Nations guidelines). Destruction outside the U.S. would not be accepted for credit under this protocol. All ODS eligible for offset credits must originate in banks currently residing within the U.S. Eligible refrigerant ODS may be collected from industrial, commercial, or residential equipment, systems, appliances or stockpiles. Eligible foam ODS may either be extracted from appliance foams and destroyed in a concentrated form or destroyed as intact foam source from building insulation. Concentrated foam blowing agent ODS must be extracted under negative pressure and then collected, stored, and transported in cylinders or other hermetically sealed containers. Likewise, intact foam that is separated from building panels must be stored, transported, and destroyed in sealed containers. Further, all destruction activities must be conducted in accordance with the Clean Air Act and must achieve 98 percent destruction efficiency (DE).

b. Number of Facilities in California

There are no commercial ODS destruction facilities in California. Five facilities in the U.S. with RCRA permits offer destruction of ODS through incineration. These five facilities are in the following locations:

- Clean Harbors Environmental Services Inc., Arkansas
- Clean Harbors Environmental Services Inc., Texas
- Clean Harbors Environmental Services Inc., Utah
- Veolia ES Technical Solutions LLC, Illinois
- Veolia ES Technical Solutions LLC, Texas

There is one non-RCRA ODS destruction facility that is currently destroying ODS and meets the requirements of the Technology and Economic Assessment Panel (TEAP) under the Montreal Protocol:

- RemTec International, Ohio

The existing ODS incineration facilities currently are operating at approximately 70 percent capacity and should possess sufficient capacity to accept the materials from the existing banks (ICF 2008). ODS would, therefore, be transported from their current locations to one of the five facilities for destruction. Based on current practices, destruction may occur mostly at the Arkansas location. It is estimated that the current total volume of banked, eligible ODS would be destroyed within an approximately 5-year period after initiation.

Construction of new ODS destruction facilities would not be reasonably foreseeable because of the availability of capacity in existing ODS destruction facilities, high cost of developing a new facility, stringent permitting requirements, and the short time needed to exhaust the total volume of the existing ODS banks in the U.S.

2. Synopsis of the Compliance Offset Protocol for Urban Forest Projects

Under the Compliance Protocol for Urban Forest Projects (Urban Forest Offset Protocol), urban tree plantings would increase in urbanized areas to permanently increase carbon storage in woody tissues. Urban forests can reduce atmospheric CO_2 directly and indirectly. As trees grow throughout their lifetime, they remove CO_2 from the air through photosynthesis, resulting in carbon sequestration within the plant tissues. This process involves transforming CO_2 into carbon, which is then used to create living matter—leaves, stems, trunk, roots (CAR 2010). Offset credits may be issued for the carbon sequestration associated with increasing tree stocks in urban areas. While urban forests also have potential additional indirect GHG-reducing benefits, such as decreased demand for air conditioning use and energy through a reduction of building heat gain, these indirect GHG reductions are not verifiable and consequently not eligible for offset credits.

Urban forest offset projects are a planned set of tree planting and maintenance activities to permanently increase carbon storage, taking into account GHG emissions associated with planting and maintenance of project trees. The tree planting projects must be implemented by local municipalities, educational campuses, utilities, and partner organizations (as the entities eligible under the protocol). Urban forest tree planting projects do not apply to large natural forest tracts (greater than 100 acres). To qualify for offset credits, the tree planting project must occur within the U.S. and within the boundary of an entity defined as:

- *Municipality* – along streets, in parks, municipal golf courses, cemeteries, parking lots, and other public open space areas, on private properties, and near municipal buildings and greenbelts.

- *Educational campuses* – along streets, near dorms, office buildings, recreational fields, and in parking lots, arboretums, and other open space areas.

- *Utility* – in parks, parking lots, within private property, along streets, and within open space areas (e.g., utility corridors or other property owned by utility agencies).

The project must obtain a net gain (i.e., new plantings must be greater than trees removed under the program) in the number of trees and tree carbon stocks. All trees planted must be in addition to or not subject to federal, state, or local tree planting regulations. To be eligible for offset credits, the project must meet the following criteria:

- Provide a tree maintenance and monitoring plan

- Record the spatial location of all tree planting sites with global positioning system (GPS) software or geographic information system (GIS) software.
- Calculate the GHG sequestration achieved from growing planted trees and account for project emissions
- Plan for a project lifetime of 100 years
- Account for the CO_2 emissions that would be generated to deliver and plant trees and ongoing maintenance activities
- Plant trees with an average spacing no less than 5 meters (approximately 15 feet)

If eligible, the project could be issued offset credits for a period of 25 years with unlimited renewals. In general, carbon sequestration from urban forests can range from 16 kilogram (kg)/year (35 lb/year) for small, slow-growing trees with 8 to 15 centimeter (cm) diameter at breast height (dbh) (3 to 6 inch dbh) to 270 kg/year (600 lb) for larger trees growing at their maximum rate. Tree planting projects that are larger (i.e., approximately 1,000 tree sites) may offer greater economies of scale in achieving carbon sequestration.

3. Synopsis of the Compliance Offset Protocol for Livestock Projects

Under the Compliance Protocol for Livestock Projects (Livestock Offset Protocol), digester projects would be implemented to better manage manure on dairy cattle and swine farms, which would result in the reduction of GHG emissions from these facilities. Manure treated and stored under anaerobic conditions decomposes to produce CH_4, which, if uncontrolled, is emitted to the atmosphere. This situation predominantly occurs when livestock operations manage waste with anaerobic liquid-based systems (e.g., in lagoons, ponds, tanks, or pits). Installation of a digester system captures and destroys CH_4 from anaerobic manure treatment and/or storage facilities on livestock operations. Under this protocol, the digester would be required to destroy CH_4 that would otherwise have been emitted to the atmosphere in the absence of the project from uncontrolled anaerobic treatment and/or storage of manure. Captured biogas can be destroyed on-site (by flaring), transported for off-site use (e.g., through gas distribution or transmission pipeline), or used to power on-site stationary combustion devices.

A livestock digester project would qualify for the issuance of offset credits if the offset project meets the following criteria:

- Must be located within the U.S.,
- Must define baseline anaerobic operational conditions, and

- GHG reductions must yield a surplus (i.e., be above and beyond the business-as-usual conditions).
- Must define baseline anaerobic operational conditions, and
- GHG reductions must yield a surplus (i.e., be above and beyond the business-as-usual conditions).

Under this offset protocol, reductions in CH_4 and CO_2 would be accounted for in determining project emissions and emission reductions. CH_4 would be captured by the digester and could be used in place of fossil fuels to power on-site stationary combustion devices, such as generators or pumping systems, or the project could alter the need to transport manure waste for off-site disposal. Avoided electricity emissions do not count toward the number of offset credits a project may be issued. In addition to CH_4, this protocol accounts for changes in direct CO_2 emissions from mobile and stationary combustion sources within the assessment boundary, which can either increase or decrease depending on project and farm specifics. CO_2 emissions from digesters are considered biogenic emissions and are not included in the GHG reduction calculation.

Digesters are one element of a biogas control system (BCS). In addition to the digester, these systems typically include a gas-handling system (e.g., pipeline), a gas-use device (e.g., flare or electric generation system), and a manure storage tank or pond to hold the treated effluent prior to land application or hauling off the site (USEPA 2002). The solids remaining after the digestion process can be used as a soil amendment or as animal bedding. BCSs can accommodate manure handled as a liquid, slurry, or semi-solid (with little or no bedding added) and are best suited at facilities that have stable year-round manure production and collect at least 50 percent of the manure daily. The size of the system is determined primarily by the number and type of animals served by the operation, the amount of dilution water added, and the desired retention time.

There are three main types of commercial BCS that have been used to manage manures of varying solids contents: covered lagoon digesters, complete mix digesters, and plug flow digesters. A covered lagoon digester is an earthen lagoon fitted with a cover that collects biogas as it is produced from the manure. A complete mix digester is a tank, constructed of either reinforced concrete or steel, with a gas-tight cover. The digester contents are mixed periodically, either by a motor-driven impeller or a pump. A plug flow digester is a long, relatively narrow tank, often built below ground level, with a gas-tight cover and is only used for dairy manure (U.S. EPA 2002).

Plug flow and complete mix digesters are typically heated systems that operate at a constant temperature year-round, producing stable gas production rates that support gas-to-energy applications in all climates. Heated digesters must be situated so that they can be heated, usually with hot-water piping running in and out of the digester tank. It may be possible to heat the water using the CH_4 produced by the digester. The tanks should also be insulated to help it retain optimal operating temperatures. Partially

burying tanks in the ground or piling soil up against the sides of the tank help to insulate the tank (Balsam 2006).

Covered lagoon digesters are not heated, and this can affect gas production rates. In warmer climates, gas production is relatively stable during all seasons and can be used for energy gas uses. However, in colder climates, gas production from covered lagoon digesters is lower during winter months and gas use may be limited to flaring (U.S. EPA 2002).

Biogas produced by the BCS is primarily CH_4 and CO_2, with traces of H_2S, and other gases. Use of raw biogas in heating equipment and in internal combustion engines may cause early failures because of the corrosive nature of the H_2S and water vapor. Therefore, biogas should be properly cleaned using appropriate scrubbing and separation techniques before use (Balsam 2006).

4. Synopsis of the Compliance Offset Protocol for Forest Projects

Under the Compliance Offset Protocol for Forest Projects (Forest Offset Protocol), reforestation, avoided conversion, and improved forest management projects would be implemented that would result in increased carbon sequestration and avoided emissions. The net effects of GHG reductions and removal enhancements would be calculated and used in issuing offset credits. Forests have the capacity to both emit and sequester CO_2. Trees, through the process of photosynthesis, naturally absorb CO_2 from the atmosphere and store the gas as carbon in their biomass (i.e., trunk [bole], leaves, branches, and roots). Carbon is also stored in the soils that support the forest, as well as the understory plants and in dead wood and litter on the forest floor. Wood products that are harvested from forests can also provide long term storage of carbon, such as in building materials that are in place for decades.

When trees are disturbed through natural events like fire, disease, and pests or through human influences (e.g., harvest, fire fuel management, controlled burns), some of their stored carbon may oxidize or decay over time releasing CO_2 into the atmosphere. The quantity and rate of CO_2 that is emitted may vary, depending on the specific situation. Forests function as reservoirs in storing CO_2. If not properly managed, forests can be a net source of emissions over finite time frames; however, with appropriate management techniques, forests can sequester CO_2 and be a sink for GHG emissions in the short and long term.

Under the Forest Offset Protocol, a forest project is defined as: “A planned set of activities designed to increase removal of CO_2 from the atmosphere, or reduce or prevent emissions of CO_2 to the atmosphere, through increasing and/or conserving forest carbon stocks.” There are three types of forest projects that would qualify under the protocol on public or private lands, as described below. All forest projects must occur within the U.S. Improved forest management projects, one of the types of forest offset projects allowed under the protocol, are limited to the contiguous U.S., excluding Hawaii and Alaska.

ARB and the Forest Offset Protocol require that credited GHG reductions or removals be additional to any reductions or removals required by law or regulation, or that would otherwise occur under a conservative business as usual scenario. The Forest Offset Protocol specifies a legal-requirement test and a performance test that are used to determine project eligibility and set the project baseline for crediting for each project type. Projects that qualify under this offset and meet the requirements as described above would be eligible to generate offset credits for a crediting period of 25 years, which can be renewed in 25-year increments. However, as a condition of renewal, projects would be required to use the latest quantification methodologies to determine GHG emission reductions rates. Project owners are also required to monitor the success of the project for a period of 100 years following the issuance of the latest offset credit to ensure the permanence of credited reductions. Further, the projects must undergo verification at least every six years.

a. Reforestation

Reforestation involves restoring tree cover on land that is not at optimal levels and has minimal, short-term (30-year) commercial opportunities. A reforestation project is only eligible if:

- The project is located in the U.S.
- The project involves tree planting or removal of impediments to natural reforestation on land that:
  - Has had less than 10 percent tree canopy cover for a minimum of 10 years; or
  - Has been subject to a significant disturbance (e.g., natural event) that has removed at least 20 percent of the land's above-ground live biomass.
- No rotational harvesting of reforested trees or any harvesting of pre-existing carbon in live trees occurs during the first 30 years after project commencement unless such harvesting is needed to prevent or reduce an imminent threat of disease.
- The tree planting, or removal of impediments to natural reforestation, does not follow a commercial harvest of healthy live trees that has occurred in the project area within the past 10 years.
- The project does not employ broadcast fertilization.
- The project does not take place on land that was part of a previously registered forest project, unless the previous forest project was terminated due to an Unavoidable Reversal.

b. Improved Forest Management

Improved forest management includes management activities that maintain or increase carbon stocks on forested land relative to baseline levels of carbon stocks. An improved forest management project is only eligible if:

- The project is located in the U.S., excluding Alaska and Hawaii.
- The project takes place on land that has greater than 10 percent tree canopy cover.
- The project employs natural forest management practices.
- The project does not employ broadcast fertilization.
- The project does not take place on land that was part of a previously registered forest project, unless the previous forest project was terminated due to an unavoidable reversal.
- Eligible management activities may include, but are not limited to:
    - Increasing the overall age of the forest by increasing rotation ages.
    - Increasing the forest productivity by thinning diseased and suppressed trees.
    - Managing competing brush and short-lived forest species.
    - Increasing the stocking of trees in understocked areas.

c. Avoided Conversion

Avoided forest conversion involves preventing the conversion of forest land, which is defined as at least 10 percent canopy cover, to a non-forest land use by dedicating the land to continuous forest cover through a qualified conservation easement or transfer to public ownership where forests are at risk of conversion. While these projects prevent the conversion of forest lands to a non-forest land use, they do not preclude ongoing forest management and may involve tree planting and harvesting. An avoided conversion project is only eligible if:

- The project is located in the U.S.
- The private forest owner can demonstrate that there is a significant threat of conversion of project land to a non-forest land use, through a demonstration that an identified non-forest land use is of significantly higher value through a real-estate appraisal, and through a demonstration of the legal permissibility of the alternative land use.
- The project does not employ broadcast fertilization.

- The project does not take place on land that was part of a previously registered forest project.
- An avoided conversion project can only occur on land that is privately-owned prior to project commencement. This project type may involve tree planting and harvesting.

3.0 ENVIRONMENTAL SETTING

This chapter of the FED contains a discussion of the existing environmental setting as it pertains to the compliance responses and the offset protocols. A discussion of the environmental setting for each environmental resource area evaluated in the FED is provided. This environmental setting is the basis for comparison of changes resulting from the implementation of the cap-and-trade regulation and for determining impact significance.

A. Aesthetics

The United States, by virtue of its size, setting, and topographic and climatic variation, exhibits tremendous scenic diversity. The varied landscape ranges from coastal to desert and valley to mountain. Innumerable natural features and settings combine to produce scenic resources that are treasured by residents and visitors alike.

Forested areas exist throughout the U.S. The hardwood forest is spread over 730 million acres and extends across 2,000 miles from the North-East to the South. Forty percent of the timber consists of deciduous hardwoods and the remaining sixty percent are coniferous evergreens (About.com. 2010). In California, forested areas can be found in elevations lower than 1,000 feet and higher than 14,000 feet. The forest landscape is itself diverse, ranging from steeply rolling foothills covered with chaparral and woodlands, to rocky, windswept crags just above the timberline. Mid-elevations may be characterized by steep-walled river canyons interspersed with gentler, highly productive forested areas with a variety of conifer and hardwood species.

B. Agriculture and Forest Resources

1. Agriculture

The 2007 Census of Agriculture recorded 2,204,792 farms in the U. S. Although the number of farms nationwide has been declining since World War II, the latest figures indicate a leveling of this trend (USDA 2007). The top five states, based on the value of agricultural products sold and on their percentage of the total value are: California (11.4 percent), Texas (7.1 percent), Iowa (6.9 percent), Nebraska (5.2 percent) and Kansas (4.8 percent). Most states have laws in place to support agriculture and protect agricultural land.

California produces nearly half of the nation's grown fruits, nuts, and vegetables and is the nation's leading dairy state. California's agricultural abundance includes more than 400 commodities, many of which are produced solely in California. (*Ibid*.) Fresno County is the nation's most productive agricultural county, with $3.7 billion (1.2 percent of the total U.S. value) sold in 2007. Of California's approximately 100 million acres of land, 43 million acres are used for agriculture. Of this, 16 million acres are grazing land and 27 million acres are cropland. Approximately 9 million acres of irrigated land, or

one-third of the state's cropland, is considered to be prime, unique, or of statewide importance.

Although California remains the nation's top agricultural producer, it and other states have experienced significant farmland loss as a result of urbanization. The California Department of Food and Agriculture estimates that about 3.4 million acres of land in California's agricultural counties are now urbanized. Development is now consuming approximately 40,000 acres of agricultural land in California per year. Other causes of agricultural land loss include the removal of agriculture for environmental purposes (such as the creation or enlargement of wildlife refuges) and withdrawals due to water shortages.

2. Forest Resources

Before European settlement, forests covered nearly one billion acres of what is now the United States. Since the mid-1600's, about 300 million acres of forest have been cleared, primarily for agriculture during the 19th century. Today, about one-third of the nation is forested. While total forest area has been relatively stable for the last 100 years (currently about 747 million acres), there have been significant regional shifts in the area and composition of the nation's forests. Reversion of marginal farmland in the East, large scale planting in the South, and fire suppression have contributed to increases in forest area. Urbanization, conversion to agriculture, reservoir construction, and natural disasters have been major factors contributing to loss of forests. Eastern forests cover about 384 million acres and are predominantly broadleaf (74 percent), with the exception of extensive coniferous forests and plantations in the Southern coastal region. These are largely in private ownership (83 percent). By contrast, about 363 million acres of Western forests are predominantly coniferous (78 percent) and in public ownership (57 percent). Nearly ten million private individuals own about 422 million acres of forest and other wooded land. Most public forest land is held by four Federal agencies (U.S. Forest Service (USFS), U.S. Bureau of Land Management (US BLM), National Park Service (NPS), and U.S. Fish and Wildlife Service (USFWS) as well as numerous state, county, and municipal government organizations (National Atlas of the United States 2009).

California contains over 33 million acres of forests comprising a broad range of tree species, tree sizes, and levels of canopy closure (USFS 2008, p.124). Conifer forests and woodlands cover over 19 million acres and are most extensive in the Sierra, Modoc, and Klamath/North Coast bioregions of the state. Hardwood forests and oak woodlands cover over 13 million acres and extend mostly along the perimeter of the Sacramento and San Joaquin Valleys and throughout the coastal ranges (USFS 2008, p. 128). The most productive timber growing portion of California's forests are approximately 19 million acres of public and private timberland—that is, land capable of growing more than 20 cubic feet of wood per acre per year and statutorily available for timber management (USFS 2008, p. 127). In the case of public ownerships (53 percent of timberlands), many lands capable of timber production have been administratively withdrawn over the past two decades for a variety of purposes and have been directed

to primary uses other than timber production. California has 9 million acres of privately owned timberland, of which 5.4 million acres are classified as timberland production zone (TPZ) where long term tax and regulatory structures favor timber production over potential conversion to other uses (USFS 2008, p. 127).).

C. Air Quality

1. California's Criteria Pollutant and Toxics Regulatory Program

The federal, state, and local governments all share responsibility for reducing air pollution. ARB is California's lead air agency and controls emissions from mobile sources, fuels, and consumer products, as well as air toxics. California's 35 air pollution control districts (air districts or districts) control emissions from industrial sources and small businesses at the local level. At the federal level, the U.S. EPA has oversight of State programs. In addition, U.S. EPA established emission standards for mobile sources such as ships, trains, and airplanes.

The responsibility for controlling emissions of criteria pollutants and toxics from stationary sources of air pollution rests with air districts. The air districts generally do this through a combination of prohibitory rules which set emission limits that vary by facility type; operating permits that specify equipment use and other operating parameters for a facility to limit emissions; and a New Source Review (NSR) program designed to accommodate industrial growth while mitigating environmental impacts.

There are two criteria pollutants of most widespread health concern in California – ozone and fine particulate matter (PM2.5). The health risk from diesel particulate matter is the largest air toxics risk, both regionally and at locations such as ports and rail yards. ARB actions are lowering these health risks, and substantial new emission reductions in both criteria pollutants and diesel particulate matter will occur between now and 2020.

Ozone, a major component of the "smog", is not directly emitted as a pollutant, but is formed in the atmosphere when reactive organic gases (ROG) and oxides of nitrogen (NO_x) emissions react in the presence of sunlight over time. Ozone concentrations often occur downwind of the emission sources, which contributes to the regional nature of ozone air pollution.

PM2.5 is a mixture of pollutants generated by a variety of sources. PM2.5 can either be emitted directly into the air in forms such as soot and smoke, or it can be formed in the atmosphere from the reactions of pollutants including NO_x, oxides of sulfur (SO_x), ROG, and ammonia. While the impacts of directly emitted PM2.5 may be seen near sources of air pollution, PM2.5 that is formed in the atmosphere has a regional impact similar to ozone.

California's mature air quality program leads the nation in terms of stringency of required emission controls, not only for mobile sources but also for stationary sources. The cap-and-trade regulation will not affect the stringency of these programs. Reducing

emissions from combustion sources is at the core of California's program to meet air quality standards for ozone and PM2.5, and also the AB 32 Scoping Plan for meeting the 2020 greenhouse gas emissions target. California's climate and criteria pollutant programs are complementary, and the AB 32 regulations ARB is adopting will provide benefits that will be incorporated into future air quality plans for ozone and PM2.5.

2. Stationary Source Regulatory Framework

a. Air District Prohibitory Rules

Each of California's air districts has rules governing existing stationary sources. These are known as prohibitory rules. They include requirements for emission limits, testing, recordkeeping, and reporting. Prohibitory rules may be facility-specific, such as limiting the maximum level of a particular pollutant at a particular type of facility, or they may address specific equipment, such as turbines, boilers, or internal combustion engines found at many types of facilities.

Prohibitory rule emission limitations reflect established emission control technologies that can be feasibly added to existing sources. The most stringent of these technologies are referred to as Best Available Retrofit Control Technology (BARCT) which is a requirement of State law. These California requirements are overlaid on federal requirements for air districts in nonattainment areas to implement Reasonably Available Control Technology (RACT) at large stationary sources. In general, BARCT requirements are typically more stringent than their RACT counterparts, but neither is as stringent as Best Available Control Technology (BACT), which applies at large new or modified facilities. BACT is described further in the section on NSR, a program designed to mitigate emission increases due to growth.

Prohibitory rules are adopted by district boards in public hearings. Rule development is a lengthy process that typically takes from one to two years and involves workshops and other opportunities for public participation. The requirements of prohibitory rules vary by district, as does their stringency. Stringency of a rule depends on factors such as applicability of the rule and exemptions; control levels or control equipment specified; and effective dates of requirements. District rules are typically submitted to U.S. EPA for inclusion in the State Implementation Plan (SIP) for nonattainment areas. Upon approval by U.S. EPA, the rules become federally enforceable.

South Coast Regional Clean Air Incentives Market (RECLAIM)

The effort to impose incremental rule changes on thousands of stationary sources under South Coast air district permits was time consuming and costly. Therefore, in the early 1990s, the South Coast developed the RECLAIM program, California's first air pollution cap-and-trade regulation. The program provides industry with flexibility to decide how to reduce emissions and advance pollution control technologies without the constraints of command and control.

RECLAIM encompasses most of the highest emitting stationary facilities in the South Coast Air Basin for NO_x and SO_x. Facilities participating in RECLAIM have annual emission allocations that decline over time. The benefits of this innovative program include lower costs and greater flexibility, as well as secured emission reductions with better emission monitoring. Because facilities can trade emissions below their cap, or purchase credits if needed, credits have monetary value, and the emissions are now part of the regular course of business for RECLAIM facilities.

New Source Review

In addition to district prohibitory rules that apply to existing sources, there are rules that apply to new or modified stationary sources. These rules represent an NSR program and are required by both federal and California law.

Within a region, NSR assures that new emissions from new and modified factories, industrial boilers, and power plants do not slow progress toward cleaner air. In areas with clean air, especially pristine areas like national parks, NSR assures that new emissions do not significantly worsen air quality. The technology provisions of NSR also provide assurance that any large new or modified industrial source will be as clean as possible, and that advances in pollution control occur concurrently with industrial expansion.

NSR applies to “major” facilities as well as “major modifications” to existing facilities. The definition of major varies by air district and depends on the severity of each district’s nonattainment classification. The worse the air quality, the lower the facility’s total emissions need be for it to be considered major.

NSR requirements are applied in a two-step process. First, any new equipment at a facility subject to this program must meet BACT control levels. This step ensures that new equipment being installed is as low-emitting as is considered technologically feasible. Next, if the change in emissions from the new equipment causes overall facility-wide emissions to exceed a threshold – the worse the air quality where the equipment is being constructed, the lower the threshold – all new emissions must be offset. This can be accomplished either by reducing emissions by the same amount elsewhere in the same facility, or by purchasing emission reduction credits (ERCs), which are previously reduced emissions, often from other facilities. Together, the BACT and offset provisions of NSR are designed to allow an area to move towards attainment of the ambient air quality standards while still allowing industrial growth.

When BACT is required, owners of facilities must ensure that the equipment they are installing will not emit air pollutants at levels greater than equipment at similar new facilities. These limits are at least as stringent as the air district’s prohibitory rules. To identify BACT for a specific stationary facility, air district staff conducts a comprehensive evaluation, including obtaining testing results or similar proof that the emission levels have been achieved in practice. District staff also conducts a broad search (even internationally, at times) for technologies that have been demonstrated through testing on similar types of stationary sources to reduce emissions to the lowest levels.

Offsets are emission reductions generally obtained from existing sources located in the vicinity of a proposed source to mitigate the emissions increase from the new source or modification. To be used as mitigation, offsets must meet certain criteria. The emission reductions must be surplus to any federal, State or local laws or regulations, and must be real, enforceable, quantifiable and permanent. California's offset requirements, reflected in district rules, generally apply to more permitting actions than federal offset requirements and are often triggered at lower-emitting facilities.

The most common method of creating ERCs is to control or curtail the emissions from an existing stationary source. Control of emissions is generally from the application of emission control technology beyond that which is required by any regulation or rule. Curtailment could be from a change in operating hours of a source, or through the shutdown of a source. Another method of creating ERCs is to reduce emissions from mobile sources beyond what is required or from the reductions in emissions from agricultural operations, for example from curtailing field burning of agricultural wastes or from using agricultural water pumps equipped with cleaner engines. Credits must be generated pursuant to district rules and regulations, and must be reviewed and certified by the district.

Typically, when ERCs are used for offsets, a larger quantity of ERCs must be secured than are being added to the air by the project. The higher a district's nonattainment classification (such as marginal, moderate, serious, severe or extreme), the higher the ratio between ERCs needed and emissions being offset. This relationship is termed the offset ratio.

If an applicant obtains emission offsets outside the areas described above, or if one type of pollutant is offset against another type, the applicant must show through modeling that these offsets will result in a net benefit to air quality. Modeling combines the emission rates from the facility with identified meteorological conditions to assess the source's air quality impacts. The emission reduction from these offsets must improve the air quality in the area affected by the emissions from the source.

The NSR program in the South Coast is not replaced by RECLAIM. BACT is determined on a case-by-case basis based on the lowest emission rates achieved in practice for the same type of equipment. Additionally, increases in emissions must be offset to the full extent. But under RECLAIM, new or modified equipment would only need to provide offsets at a one to one ratio prior to the start of operation, a lower ratio than otherwise required in the South Coast air district under the prohibitory rules.

The stringency of emission controls required by NSR and prohibitory rules is not static, but is ever-advancing. Of the two programs, the technology-forcing requirements of BACT evolve more rapidly and eventually result in more stringent prohibitory rules, and lower BARCT emission levels. As BACT technologies become more widely used for new stationary sources, air districts can then update their prohibitory rules to reflect these newer technology levels that are being achieved in practice.

For example, low- NO_x burners used in natural gas-fueled boilers that emitted NO_x at 30 parts per million levels were previously considered BACT, but later were considered BARCT. Since then, BACT has advanced significantly, and BARCT in many districts has dropped to levels as low as 5 parts per million for some boiler sizes.

b. Air Pollution Permits

The purpose of air pollution permits is to provide specific parameters under which a facility must operate so as to meet its obligations under prohibitory rules, NSR, and in the case of the South Coast air district, RECLAIM. The primary benefit to the public is that air permits limit the amount of air pollution allowed at a stationary source. Permits are issued by air districts to govern the emissions from regulated stationary sources. Permitting practices vary considerably between districts. Depending on its size, a facility may have many permits, although some districts issue one permit for an entire facility.

Air quality permits are legally binding documents that include enforceable conditions with which the facility owner or operator must comply. Permit conditions include specific requirements for facilities to operate pollution control equipment, limit pollution emissions, and report violations. They specify what construction is allowed, what emission limits must be met, and often how the source can be operated. Permits may also contain conditions to make sure that the source is built to match parameters in the application that the permit agency relied on in their analysis. For example, the permit may specify stack heights that the permit agency used in their analysis of the source. To assure that sources follow the permit requirements, permits also contain monitoring, recordkeeping, and reporting requirements.

There are two types of permits: construction permits (or authority to construct permits) and operating permits. Construction permits are required for all new stationary sources and all existing stationary sources that are adding new emissions units or modifying existing emissions units. Operating permits are required for all major stationary sources and some minor sources of air pollution. Local agencies also require operating permits for minor sources. One type of operating permit is a Title V permit, which is a single federal operating permit for each large source that lists all federal permit conditions. A Title V permit also requires that the source report its compliance status with respect to permit conditions to the agency that issued the permit and to U.S. EPA.

Permits specify the maximum potential to emit air pollutants for each permitted unit at a facility. This level of emissions is based on the maximum expected throughput or use of a piece of equipment or process. Ideally, actual emissions are lower than permitted levels. The difference in emissions between permitted levels and actual levels is termed “headroom.” Facilities need some headroom in their permits to account for the cyclical and seasonal nature of business operations. Emissions from peaker power plants, for instance, may vary considerably from one year to the next, so the maximum permitted levels for these facilities may significantly exceed actually emitted levels in a given year. These facilities typically run during periods of high electrical demand, such

as in the summer months. Need for electricity from peaker plants is impacted by temperatures, as well as the amount of rainfall and snowfall received earlier that year.

The amount of headroom at facilities can indicate the extent to which a facility could increase emissions without triggering requirements of NSR. However, at many air districts such a comparison of permitted and actual emissions is only meaningful at the equipment level and not at the facility level. At these districts, each unit of permitted equipment has a maximum permitted emission limit and its unique headroom. If the facility owner modifies that equipment or its operation such that actual emissions would exceed permitted levels, NSR would apply. In other words, for a large facility such as a refinery, which could have hundreds of permits, NSR provisions could kick in well before, and probably many times before total facility emissions exceeded the sum of emissions allowed from all permits.

For example, a facility that wanted to increase its production significantly could choose to install new equipment, increase throughput in existing equipment, or do both. Even if some permit conditions at the facility allowed for large increases in production, other more restrictive conditions on individual pieces of equipment would likely prove more constraining. A choice by the facility's owner to add new equipment would trigger the requirements of NSR. Further increasing the use of existing equipment could soon bump up against permitted levels for that equipment, also triggering NSR.

The amount of time it takes to get a permit varies according to many factors, including what type of permit it is, its complexity, who the permitting authority is, how controversial the project is, and whether the permit is appealed after issuance. The time frame for NSR permits issued by State and local air pollution control agencies varies, and is often specified in local regulations. In California, State law requires agencies to issue NSR permits within 180 days.

All Title V permits, and district rules addressing permitting of large sources, require a public comment period during which anyone can submit written comments on the proposed permits. Permit applications and permits are available to the public. In many cases, any member of the public may request a public hearing to discuss issuance of a particular permit. In addition, the public may petition U.S. EPA to object to the issuance of a Title V permit.

A source that violates one or more enforceable permit condition(s) is subject to an enforcement action including, but not limited to, penalties and corrective action. Enforcement actions can be initiated by the local permitting authority, U.S. EPA, or in many cases as a result of public complaints.

3. Air Toxics Programs

California's air toxics program began in 1983 with the adoption of the Toxic Air Contaminant Identification and Control Act. The air toxics program has indentified almost 200 substances which are hazardous to the people of California, and the list continues to grow. Among those listed are asbestos, perchloroethylene, and diesel particulate matter (diesel PM). Of these, about nine air pollutants emitted in California pose the greatest regional cancer risk.

The highest risk comes from particulate matter from diesel-fueled engines (diesel PM). In addition to diesel PM, benzene and 1,3-butadiene are also significant contributors to overall ambient public health risk in California. The other six toxic air contaminants posing the greatest ambient risk are acetaldehyde, hexavalent chromium, *para*-dichlorobenzene, formaldehyde, methylene chloride, and perchloroethylene.

ARB has a comprehensive process to prioritize the development of control measures for toxic air contaminants posing the greatest risk. This ongoing review ensures ARB's resources are focused on control activities that most benefit public health. Statewide, diesel PM contributes approximately 80 percent of the known risk from air toxics today and is the most common airborne toxic that Californians breathe. Because of this significant risk, ARB has adopted a diesel risk reduction plan and multiple regulations to implement the plan.

For the remaining high priority air toxics, ARB has adopted 17 airborne toxic control measures that reduce the health impacts from both mobile and stationary sources. These measures include reducing chromium emissions from decorative chrome plating facilities, reducing benzene from retail gasoline service stations, prohibiting the sale and use of automotive coatings containing hexavalent chromium or cadmium, and prohibiting the use of asbestos-containing rock on unpaved roads. These air toxic control measures require stringent controls and in some cases, complete elimination of the use of the toxic air pollutants. For air toxic control measures that apply to stationary sources, the districts typically adopt the State control measure into their own rules.

Control measures that reduce toxic air contaminants adopted by ARB have resulted in significant reductions of toxic emissions. Since the early 1990s, the estimated cancer risk from toxic air pollutants, measured statewide, has been reduced by 60 percent even though California has had significant growth.

a. Hot Spots Act

In addition to these statewide airborne toxic control measures, there are also reporting and risk reduction requirements that apply to existing facilities under the "Air Toxics Hot Spot Information and Assessment Act" (Hot Spots Act). The goal of the Hot Spots Act is to collect emissions data, identify facilities having localized impacts, ascertain health risks, and develop plans to reduce risk. High priority facilities must develop a Health Risk Assessment (HRA). Thresholds for priority facilities are determined by air districts, and consider the potency, toxicity, quantity, and volume of hazardous materials

released, as well as proximity of facilities to potential sensitive receptors. Criteria for these thresholds were developed by the California Air Pollution Control Officers Association in consultation with the Office of Environmental Health and Hazard Assessment. The HRA provides an evaluation of the potential for adverse health effects that can result from public exposure to toxic emissions emitted by the facility. An HRA addresses three categories of health impacts: acute health effects from inhalation only, chronic non-cancer health effects, and cancer risks from multiple means of exposure. Facilities that are determined to present a significant risk must develop a plan to implement measures to reduce that risk.

b. Local Air District Regulations

Local air districts have primary jurisdiction over stationary sources and are responsible for permitting equipment and sources at facilities that generate air toxics. Districts also review and approve permits for new or expanding facilities that emit air toxics. This review includes an estimate of the impacts likely to occur from changes in operations at the facility. Districts can work with facilities during permitting so that the facility uses less toxic materials and less toxic processes in order to reduce emissions of air toxics. These actions taken by existing and new facilities help reduce the levels of air toxics emitted from facilities in order to protect public health.

Districts also conduct frequent inspections of facilities where air toxics are known to be released. These inspections help to ensure that facilities are meeting their district permitting requirements, and that their emissions control devices are being maintained and operated properly. Inspections are an important part of district activities to reduce health impacts from air toxics.

4. Clean Vehicle and Diesel Risk Reduction Programs

a. Criteria Emissions Control Program

California has dramatically tightened emission standards for on-road and off-road mobile sources and the fuels that power them. California's emission control program for on-road motor vehicles is the strongest in the world. New cars are now 99 percent cleaner than their uncontrolled counterparts. Trucks are now 90 percent cleaner, and will be 98 percent cleaner by 2010.

ARB rules adopted as part of the Diesel Emission Reduction Program and Goods Movement Program are primarily toxics control measures, but also achieve significant criteria emission reductions. Therefore, those programs are treated as criteria emission control programs in this chapter.

Working in concert with the U.S. EPA, standards for goods movement sources have also been tightened dramatically. By requiring low-sulfur fuel, SO_x emissions from ship auxiliary engines will be cut 96 percent by 2010. New locomotive engines are now 50-60 percent cleaner. Harbor craft emission standards were cut roughly in half. New cargo handling equipment will be 95 percent cleaner by 2011.

California has also drastically lowered emission standards for off-road sources, from lawn and garden equipment, to recreational vehicles and boats, to construction equipment and other large off-road sources. From 2010 through 2014, these new off-road sources will be manufactured with 80-98 percent fewer emissions than their uncontrolled counterparts.

ARB has worked closely with U.S. EPA to regulate large diesel, gasoline and liquid petroleum gas equipment – where authority is split between California and the federal government – and by 2014, new large off-road equipment will be 98 percent cleaner. ARB has also made great strides in reducing emissions from the smaller engines under State control, like those used in lawn mowers, jet skis, recreational vehicles, and boats. From 2010 to 2015, these new off-road sources will be manufactured with 82-90 percent fewer emissions than their uncontrolled counterparts.

Adopted regulations have made significant strides in reducing emissions from those mobile sources already in use--the legacy fleet--by keeping existing vehicles cleaner longer, getting cleaner technology on older vehicles and equipment, and replacing older dirtier vehicles and equipment with cleaner ones. Whereas new engine emissions have been regulated for a long time, most of the in-use control programs have just begun to evolve and have an impact.

Many programs and rules are currently in place to reduce emissions from the mobile source legacy fleets. The Smog Check Program ensures that passenger vehicles stay clean as they age and on-board diagnostic systems identify smog control problems. Heavy-duty truck inspection programs help control smoke emissions and detect emission control mal-maintenance and tampering.

ARB has adopted well over 20 in-use regulations in the last eight years. ARB's landmark in-use regulations adopted in 2007 and 2008 will accelerate replacement of higher-emitting heavy-duty trucks, buses and construction equipment. In-use regulations have required use of cleaner fuels, greatly reducing emissions from ships and harbor craft. ARB has adopted public and private fleet rules that require local governments and private companies to incorporate the cleanest vehicles and equipment into their fleets. In-use testing procedures and verification requirements for in-use emission control technology have been strengthened. In addition, other operational and emission control technology requirements that help reduce emissions from existing vehicle and equipment have been put into place.

Incentive programs have worked hand-in-hand with in-use regulations, providing added emissions benefits. California is currently investing up to $140 million per year to clean up older, higher-emitting sources through the Carl Moyer Program. The Smog Check Breathe Easier Campaign pays motorists $1,000 to permanently retire their high-polluting vehicles. And local governments use special vehicle registration fees to fund projects that further reduce emissions from motor vehicles.

In 2007 the Board adopted a new statewide strategy for reducing emissions that contribute to high ozone and PM2.5 levels. The 2007 State Strategy, together with local control strategies, is designed to allow California to meet the U.S. EPA's national ambient air quality standards for ozone and PM2.5. As of April, 2010, ARB had adopted twelve regulations to reduce criteria pollutant emissions and fulfill commitments made in the 2007 State Strategy. The adopted rules are shown in Table 3-1.

The SIP and Statewide Strategy are focused on areas with pollution levels that exceed national air quality standards for ozone and PM2.5. However, most of the control measures adopted pursuant to the Statewide Strategy will reduce emissions, and improve air quality, throughout the State. These controls also fulfill commitments made in ARB's Diesel Risk Reduction Plan (September 2000) and Goods Movement Emission Reduction Plan (April 2006), and help all areas make progress towards attaining California's more protective ambient air quality standards.

Table 3-1
Rules Adopted Pursuant to the 2007 State Strategy

ARB Rules	Adoption Date
Enhanced Vapor Recovery for Above Ground Storage Tanks	June 2007
Modifications to Reformulated Gasoline Program – Phase 3	June 2007
Cleaner In-use Off-Road Equipment	July 2007
Light-Duty Vehicle Catalyst Replacement	October 2007
Clean Up Existing Harbor Craft	November 2007
Port Truck Modernization	December 2007/ December 2008
Ship Auxiliary Engines (Cold Ironing)	December 2007
Consumer Products	June 2008/ November 2008
Clean Fuel Requirements for Ship Main Engines	July 2008
Portable Outdoor Marine Tanks Evaporative Emission Standards (partial)	September 2008
Large Spark-Ignited Engines, Rule Amendment	November 2008
Cleaner In-Use Heavy-Duty Trucks	December 2008

b. Diesel Risk Reduction Plan

In September 2000, ARB adopted an aggressive plan to require cleaner diesel fuel and cleaner diesel engines and vehicles. The Diesel Risk Reduction Plan targets reductions of diesel emissions from year-2000 levels by 75 percent by 2010 and 85 percent by 2020. Since the adoption of the Diesel Risk Reduction Plan, some of the strategies in place today that are reducing diesel PM include:

- **Cleaner diesel fuel.** The sulfur level in California diesel fuel was lowered to less than 15 parts per million in July 2006. ARB's fuel regulation applies to on-road, off-road, and stationary engines, while the federal low sulfur diesel rule applies only to on-road vehicles.

- **Cleaner new diesel engines.** In 2001, ARB adopted new PM and NO_x emission standards to clean up new on-road diesel engines that power big-rig trucks, trash trucks, delivery vans, and other large vehicles. The new PM standard is a 90 percent reduction from the existing PM standard. U.S. EPA has also set new standards that would reduce the emissions from off-road engines to levels similar to the on-road engines by the middle of the next decade.

- **Cleaner in-use diesel engines.** ARB has adopted regulations aimed at reducing PM and other pollutants from in-use diesel engines through engine replacement; retrofit with verified diesel emission control system to the existing engine; vehicle replacement with an alternative-fueled vehicle or a vehicle with a new, cleaner diesel engines; and operational modifications including reduced operating time or reduced idling.

c. Goods Movement Program

Air pollution from international trade and all goods movement in California is a major public health concern at both regional and community levels. Goods movement is now the dominant contributor to transportation emissions in the State. In April 2006, ARB approved the *Emission Reduction Plan for Ports and Goods Movement* in California to reduce the emissions and health risk in communities near ports, rail yards, and high-traffic corridors. The plan will reduce emissions of diesel PM, the NO_x and SO_x that contribute to fine particles, and, to a lesser extent, the ROG that mixes with NO_x in the atmosphere to form regional ozone. The plan envisions emission reductions at each step in the goods movement path—from ship to shore to truck or locomotive to the final destination. Plan goals for each of the following emission source types are described in Table 3-2.

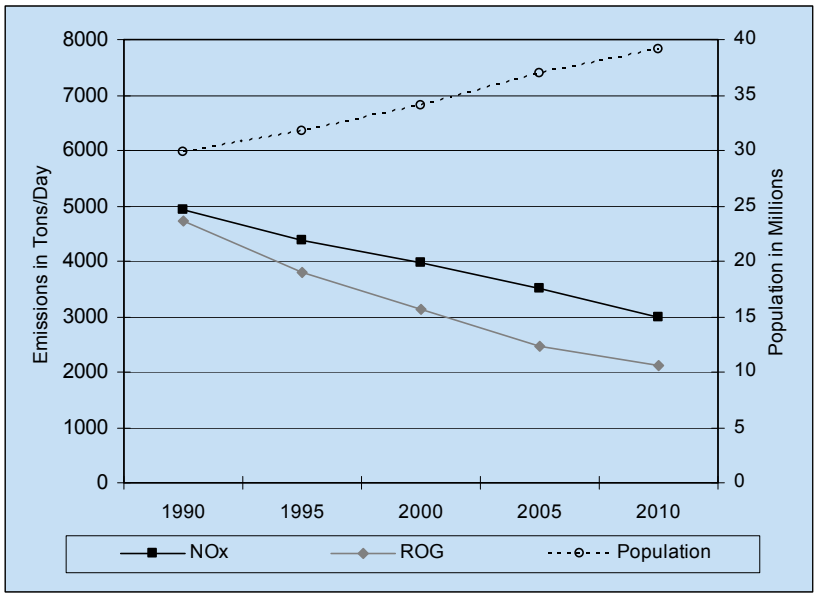
Table 3-2
Goods Movement Program Control Targets for 2020

Source	Control Target (Percent Reduction)
Ships	• Diesel PM – 50% • SO_x – 80%
Trucks	• Diesel PM – 67% • NO_x – 67%
Locomotives	• Diesel PM – 80% • NO_x – 80%
Harbor Craft	• Diesel PM – 70% • NO_x – 70%
Cargo Handling Equipment	• Diesel PM – 95% • NO_x – 80%

5. Emissions

Due to the combined efforts of State and local control programs, emissions have declined dramatically since 1990 despite substantial growth in the State's population. As shown in Figure 3-1, NO_x and ROG emissions, which are precursors to ozone, have dropped 40 and 55 percent respectively statewide. Control programs aimed at mobile sources have played a significant role in these trends.

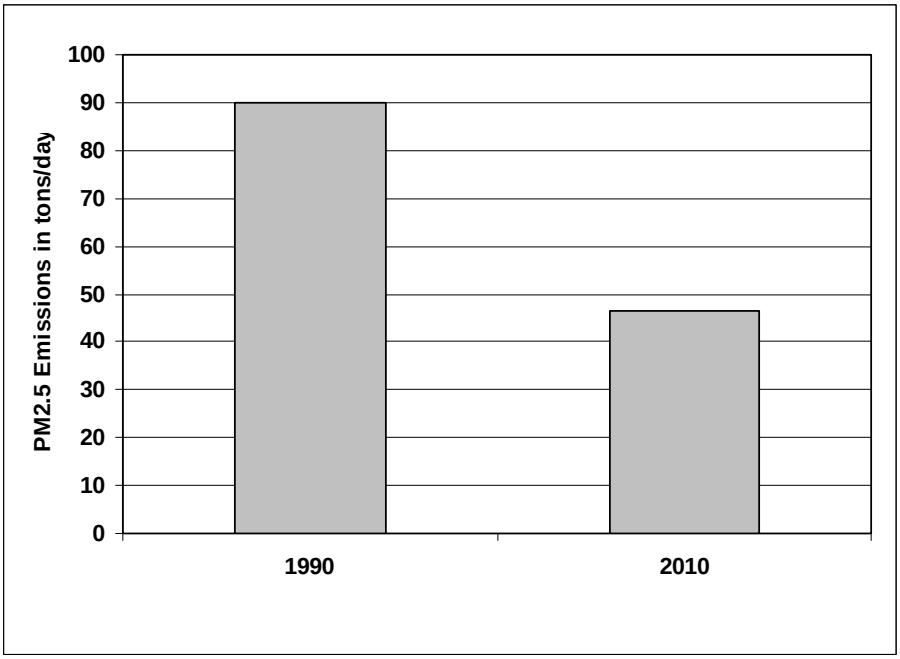
Figure 3-1
Statewide Ozone Precursor Emission Trends



PM2.5 emissions from mobile sources have also decreased significantly since 1990. Figure 3-2 highlights the statewide reductions in PM2.5 emissions on-road mobile sources. Emissions have decreased by approximately 50 percent. Much of the emphasis on reducing emissions of fine particulates came as a result of ARB's identification of diesel particulate matter as a toxic air contaminant in 1998.

Similarly, air toxic emissions are also being reduced over time, including an approximately 60 percent drop in emissions of perchloroethylene, benzene, and hexavalent chromium, and an approximately 25 percent drop in emissions of 1,3-butadiene and methylene chloride during the past decade. These downward trends in emissions of air toxics are expected to continue.

Figure 3-2
Statewide On-Road Mobile Source PM2.5 Emission Trends



6. Air Quality

As a result of the emission reductions described above, California has made significant progress in reducing public exposure to unhealthy levels of air pollution, and concentrations are now significantly lower than they were 20 years ago. However, at the same time, the targets for defining clean air have become more stringent. As a result, despite continuing improvements in air quality, more areas violate the new standards. Changes to the national ozone standards provide an illustration of this situation.

To keep pace with the current science, U.S. EPA periodically reviews the National Ambient Air Quality Standards and revises them as needed to reflect the most recent health information. U.S. EPA initially established the federal ozone standard as a 1-hour standard to protect against short-term exposure impacts. In the late 1990s, the 1-hour standard was replaced with an 8-hour standard to protect against long-term exposure impacts. More recent health studies show the need for an even more health-protective standard, and U.S. EPA is currently considering an even lower level for the 8-hour standard.

Table 3-3 shows how various areas of California compare under the original 1-hour and current 8-hour national ozone standards in 1990 and 2009. In 1990, only one major urban area met the national one-hour ozone standard (Monterey). By 2009, five additional areas came into compliance, including the San Francisco Bay Area, San Diego, and Ventura. However, several of these areas, including San Diego and

Ventura, do not meet the more stringent 8-hour ozone standard. Despite the changes in the standard, today more than two-thirds of the State's population live in areas where ozone air quality meets the 8-hour standard. This percentage has increased steadily over the years; in 1990 less than a third of the State's population lived in areas that met the standard. These clean areas include the coastal portion of the South Coast and the northern portion of the San Joaquin Valley.

Table 3-3
Compliance with Federal Ozone Air Quality Standards in California's Major Urban Areas

AREA	1-Hour Ozone Standard (0.12 ppm)		8-Hour Ozone Standard (0.08 ppm)	
	Area Met Standard in 1990	Area Met Standard in 2009	Area Met Standard in 1990	Area Met Standard in 2009
Monterey Bay Area	✓	✓	✓	✓
Sacramento Metro Area				
San Diego		✓		
San Francisco Bay Area		✓		✓
San Joaquin Valley				
San Luis Obispo County*		✓		✓
Santa Barbara County		✓		✓
South Coast				
Ventura County		✓		

* Available data show no violation of standard at San Luis Obispo sites, but the current high concentration site was not yet operating. Therefore, is very likely the area violated both standards in 1990.

a. Ozone Trends

California's highest ozone concentrations are now close to half of what they were in 1990. In the South Coast, concentrations have decreased approximately 35 percent since 1990, and today nearly half (45 percent) the population (more than 6 million people) live in areas where ozone air quality meets the federal standard. Other portions of the South Coast also show substantial improvement. The areas – and population – experiencing the highest ozone levels have decreased in size dramatically, and South Coast residents experience those elevated levels on fewer days. Since 1990, the annual number of days that exceed the federal ozone standard have been cut nearly in half. Generally, the greatest improvements have occurred in areas that had the largest number of unhealthy days in 1990.

Air quality in California's inland areas continues to remain a significant challenge, and progress in the San Joaquin Valley has been slower than in other parts of California. However, although concentrations in the San Joaquin Valley have seen only a modest decrease, the frequency of exposure to unhealthy air has decreased significantly since

1990, with the average number of days exceeding the federal 8-hour ozone standard declining by 22 percent. And, although the 8-hour design value has come down slowly, the areas – and population – experiencing the highest ozone levels have decreased in size dramatically and Valley residents experience those elevated levels on fewer days.

In the San Francisco Bay Area ozone concentrations were only slightly higher than the federal standard in 1990 and have decreased approximately 11 percent since then. Ozone concentrations in the Bay Area are now below the federal standard.

b. PM2.5 Trends

While PM2.5 concentrations have only been measured for approximately ten years, significant progress has already occurred in this short time period. Annual average PM2.5 concentrations have declined by at least 20 percent since 2002 throughout much of California. Similar progress has been seen in reducing daily (24-hour) concentrations. As with ozone, some of the most significant progress has occurred in the coastal areas.

In the South Coast, both annual average and daily PM2.5 concentrations have decreased by 30 to 50 percent since 2001. In addition, the number of days above the federal 24-hour PM2.5 standard has decreased over 80 percent, dropping from 120 days in 2001 to less than 20 days today.

The Bay Area met the federal annual average PM2.5 standard in 2001, and PM2.5 concentrations have decreased nearly 30 percent since then. Daily concentrations are only slightly above the federal standard and occur in only a small region in the East Bay.

We continue to face significant challenges to improving PM2.5 levels in the San Joaquin Valley. Nevertheless, annual average concentrations have decreased approximately 10 percent since 2001 and the most recent year's data shows that values continue to decrease. While the Bakersfield region in the southern Valley experiences the highest levels of PM2.5, other monitors throughout the San Joaquin Valley are reaching values at or near the federal standard.

c. Toxic Air Contaminant Trends

ARB maintains a statewide air quality monitoring network for toxic air contaminants that currently includes 17 monitoring stations measuring ambient concentrations of over 60 substances. Nine individual air toxics, including diesel PM, account for the majority of the potential health risk in California. Exposure to diesel PM is the largest health concern, accounting for approximately 80 percent of the statewide risk. Unlike other air toxics, there is currently no method for directly monitoring diesel PM concentrations in the ambient air. However, diesel PM concentrations can be estimated from levels of other co-pollutants such as NO_x and elemental carbon. Over the last 20 years, concentrations of these indicators have decreased substantially.

As a result of controls on motor vehicles, fuels, stationary sources, and consumer products, the public's exposure to other air toxics has also decreased dramatically. Between the early 1990's and today, the decrease in Statewide average health risk ranged from approximately 20 percent for formaldehyde, to approximately 90 percent for perchloroethylene. Air toxics associated with motor vehicles and their fuels such as 1,3-butadiene and benzene have also seen significant decreases of 80 to 85 percent as a result of ARB's mobile source control program. In aggregate, the estimated cancer risk from air toxics has been reduced by approximately 60 percent since the early 1990s.

It is important to note, however, that the routine air toxics monitoring network is designed to reflect regional exposures. Although ongoing control programs have been effective in reducing regional levels, there may still be situations of localized toxics exposure due to proximity to individual facilities. Specialized monitoring studies are often needed to better characterize these localized impacts, which often have very steep gradients that drop off quickly farther from the source. Thus, conducting monitoring to capture these gradients is generally resource intensive.

D. Biological Resources

The United States comprised of many different biological provinces, or biomes, including tundras, coniferous forests, deciduous forests, tropical rain forests, grasslands, and deserts. Each biome provides a sanctuary to a diverse variety of biological species. Scientists have documented more than 200,000 species in the U.S. (Nature Conservancy, 2002), representing more than 10 percent of the species worldwide.

California is one of the most biologically diverse areas in the world. Its varied topography and climate have given rise to a remarkable diversity of habitats and a correspondingly diverse array of both plant and animal species. California has more species than any other state in the U.S. and also has the greatest number of endemic species, those that occur nowhere else in the world (DFG 2007, p.11).

California contains examples of most of the major biomes in North America, including grassland, shrubland, deciduous forest, coniferous forest, alpine tundra, mountains, deserts, temperate rainforest, marine, estuarine, and freshwater habitats. Each of these biomes contains many different types of plant communities, such as redwood forests, vernal pool wetlands, or blue oak woodlands. Altogether, the state supports 81 types of forests, 107 types of shrub lands, and 52 types of plant communities dominated by herbaceous plants, in addition to 27 other types of vegetation (Sawyer and Keeler-Wolf 1995, vegetation series tables).

California contains over 33 million acres of forests comprising a broad range of tree species, tree sizes, and levels of canopy closure (USFS 2008, p.124). Conifer forests and woodlands cover over 19 million acres and are most extensive in the Sierra, Modoc, and Klamath/North Coast bioregions of the state. Hardwood forests and oak

woodlands cover over 13 million acres and extend mostly along the perimeter of the Sacramento and San Joaquin Valleys and throughout the coastal ranges (USFS 2008, p. 128). The most productive timber growing portion of California's forests are approximately 19 million acres of public and private timberland—that is, land capable of growing more than 20 cubic feet of wood per acre per year and statutorily available for timber management (USFS 2008, p. 127). In the case of public ownerships (53 percent of timberlands), many lands capable of timber production have been administratively withdrawn over the past two decades for a variety of purposes and have been directed to primary uses other than timber production. California has 9 million acres of privately owned timberland, of which 5.4 million acres are classified as TPZ where long term tax and regulatory structures favor timber production over potential conversion to other uses (USFS 2008, p. 127).

Although the area of private forest land in California is substantial—over 13 million acres—only about 5 million acres of it is managed by the forest industry. Roughly 7 percent of these 5 million acres is managed by a comparatively new and rapidly growing owner subclass consisting of timberland investment management organizations and real estate investment trusts. These owners may or may not manage primarily for timber production, and evidence suggests that at least some of the forest land they control is ultimately destined for such nonforest uses as residential and tourism development (USFS 2008, p. iii).

Some parts of the state are particularly rich in plant species diversity. Areas with the greatest number of plant species are the Klamath and inner North Coast ranges, the high Sierra Nevada, the San Diego region, and the San Bernardino Mountains. Other regions with considerable plant diversity are the outer North and Central Coast Ranges, the Cascade Range, the Sierra Nevada foothills, and the western transverse Range (DFG 2007, p.13).

California has a great number of animal species, representing large portions of wildlife species nationwide. The state's diverse natural communities provide a wide variety of habitat conditions for wildlife. The state's wildlife species include 84 species of reptiles (30 percent of the total number found in the U. S.); 51 species of amphibians (22 percent of U.S. species); 67 species of freshwater fish (8 percent of U.S. species); 433 species of birds (47 percent of U.S. species); and 197 mammal species (47 percent of U.S. species). Seventeen species of mammals, 17 species of amphibians, and 20 species of freshwater fish live here and nowhere else (DFG 2007, p. 13). Animal species are not equally distributed across the state. Some of California's natural communities are particularly rich in wildlife species, supporting hundreds of species each. Twenty-four habitats—including valley foothill riparian, mixed conifer, freshwater wetlands, mixed chaparral, and grasslands in the state—support more than 150 terrestrial animal species each. Oak woodlands also are among the most biological diverse communities in the state, supporting 5,000 species of insects, more than 330 species of amphibians, reptiles, birds and mammals, and several thousand plant species (DFG 2007, p.14).

E. Cultural Resources

Cultural resources include archaeological sites of prehistoric or historic origin, built or architectural resources older than 50 years, traditional or ethnographic resources, and fossil deposits of paleontological importance. America has a cultural heritage that dates back to some 25,000-60,000 years ago, when the first known inhabitants of the land that would eventually become the United States crossed the Bering land bridge into Alaska.

All areas within the U.S. have the potential for yielding as yet undiscovered archaeological and paleontological resources and undocumented human remains not interred in cemeteries or marked formal burials. These resources have the potential to contribute to our knowledge of the fossil record or local, regional, or national prehistory or history.

Archaeological resources include both prehistoric and historic remains of human activity. Built environment resources include an array of historic buildings, structures, and objects serving as a physical connection to America's past. Traditional or ethnographic cultural resources may include Native American sacred sites and traditional resources of any ethnic community that are important for maintaining the cultural traditions of any group. "Historical resources" is a term with defined statutory meaning and includes any prehistoric or historic archaeological site, district, built environment resource, or traditional cultural resource recognized as historically or culturally significant (PRC Section 21084.1; 14 CCR Section 15064.5(a)). Paleontological resources, including mineralized, partially mineralized, or unmineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains, are more than 5,000 years old and occur mainly in Pleistocene or older sedimentary rock units.

California was occupied by different prehistoric cultures dating to at least 12,000 years ago. Evidence for the presence of humans prior to about 8,000 years ago during the Paleoindian Period is relatively sparse and scattered throughout the state. With climate changes and the drying of pluvial lakes, subsistence during the Early and Middle Archaic Periods shifted to an increased emphasis on plant resources, evidenced by an abundance of milling implements in archaeological sites dating between 8,000 and 3,000 years ago. After approximately 3,000 years ago, during the Upper Archaic and Late Prehistoric Periods, the complexity of the prehistoric archaeological record reflects increases in specialized adaptations to locally available resources such as acorns and salmon, permanently occupied settlements, and the expansion of regional populations and trade networks, as well as the development of social stratification and craft specialization.

At the time of European contact, California was the home of approximately 310,000 indigenous people with a complex of cultures distinguished by linguistic affiliation and territorial boundaries. Distinct native Californian cultural groups spoke approximately 74 languages. At least 70 groups, with even more subgroups, inhabited the vast lands

within the state (Smithsonian Institution 1978, 1986, 1988). In general, these mainly sedentary, complex hunter-gatherer groups shared similar subsistence practices (hunting, fishing, and collecting plant foods), settlement patterns, technology, material culture, social organization, and religious beliefs. They situated permanent villages along the coast, interior waterways, and near lakes and wetlands. Population density among these groups varied, depending mainly on availability and dependability of local resources, with the highest density of people occurring in the Santa Barbara Channel area and the least in the state's desert region.

The effect of Spanish settlement and establishment of missions in California marks the beginning of a devastating disruption of native culture, with forced population movements, loss of land and territory (including traditional hunting and gathering locales), enslavement, and decline in population numbers from disease, malnutrition, starvation, and violence. California's native population was reduced to about 100,000 people by 1850; by 1900, there were only 20,000--less than seven percent of the pre-contact number (Smithsonian Institution 1978). Existing reservations were created in California by the federal government beginning in 1858 but encompass only a fraction of native lands. Many California groups continue to await federal tribal status recognition.

In 1848, shortly after California became a territory of the U.S., gold was discovered at Sutter's Mill. The resulting Gold Rush era influenced the history of the state and the nation. Thousands of people flocked to the gold fields along the Sierra foothills, and in 1850 California became the 31st state. After the completion of the transcontinental railroad in 1869, settlers and immigrants continued to pour into the state. Settlement of the American West was also encouraged by passage of the Swampland Acts of the mid 1800s-early 1900s and the Homestead Act of 1862, among others. The multi-ethnic character of the state today is one result of the Gold Rush, plus later waves of migration. Buildings and structures in today's urban cores, rural landscapes, coastlines, deserts, forests, and parks, as well as historic archaeological sites, reflect the importance of mining, the growth of agriculture, ranching and transportation networks, and the economic development of industries based on the state's wealth of natural resources, such as lumber, minerals, fish, and petroleum deposits, that contributed to the state's economy and its continuing growth and development. Architectural resources also reflect the development in California in the mid- to late-1900s of the defense, aerospace, communication and tourism industries.

Significant nonrenewable vertebrate or invertebrate fossils or unique geologic units have been documented throughout the state and are likely present in many out-of-state areas. Because the majority of California was underwater until the Tertiary Period, marine fossils older than 65 million years are not common and are exposed mainly in the mountains along the border with Nevada, the Klamath Mountains, Jurassic shales, sandstones and limestones along the edges of the Central Valley, and portions of the Coast and Transverse Ranges, and the Peninsular Ranges. As a result of changes in sea level and increases in tectonic activity during the Tertiary, marine as well as terrestrial fossils may be found scattered about the state, particularly along the coast, edges of the Central Valley, northeastern plateau, and southeastern deserts. Tertiary

marine fossils have been found, for example, under the streets of Los Angeles during storm drain and subway construction. Dating between 1.8 million and 11,000 years ago, Pleistocene continental sedimentary rock units are found throughout the state and have yielded a variety of plant and vertebrate fossils. Pleistocene fossil localities include large lake deposits, such as Lake Manix in the Mojave Desert, marine terrace deposits along the coast, particularly the southern coast, and the La Brea Tar Pits, a well-known locality in Los Angeles that has produced a variety of extinct terrestrial fauna dating to the last Ice Age. Extinct Pleistocene fossils, including mammoths, have also been found during development projects near Sacramento, in Livermore, in southern California, and on the Channel Islands. Holocene-age deposits (less than 11,000 years old), such as those that blanket the majority of the Central Valley floor, are geologically immature and generally unlikely to contain fossils. One exception is the Lake Cahuilla deposits in today's Colorado Desert that have yielded freshwater fossils and small terrestrial vertebrates and date between 270 and at least 6,000 years ago.

F. Energy Demand

Energy is essential to virtually every facet of the U.S. economy. The U.S ranks seventh in energy consumption per-capita (US DOE, 2010). As of 2005, it is estimated that forty percent of the nation's energy comes from petroleum, 23 percent from coal, 23 percent from natural gas, 8.4 percent from nuclear power, and 7.3 percent from renewable energy (US DOE, (2008).

In California, fossil fuels are the primary source of energy, powering electricity generation, transportation demand, and virtually all major industrial operations. Reducing emissions from fossil fuels is a key strategy for the reduction of GHG emissions in California.

As of 2008, the mix of sources of California's energy generation consists of: 45.7 percent natural gas, 18.2 percent coal, 14.4 percent nuclear, 11.0 percent large hydropower, and 10.6 percent renewables. In-state generating facilities account for about 68 percent of total generation, with the remaining electricity coming from out-of-state imports. Since deregulation in 1998, CEC has licensed more than 60 power plants: 44 projects representing 15,220 MW are on-line, 6 projects totaling 1,578 MW are under construction, and 12 projects totaling 6,415 MW are on hold but available for construction. In addition, CEC has a historic high level of more than 30 proposed projects under review, totaling more than 12,000 MW, many of which are large-scale solar thermal power plants (CEC 2009, p.2).

On the demand side, Californians consumed 285,574 gigawatt hours of electricity in 2008, primarily in the commercial, residential, and industrial sectors. A CEC staff forecast of future electricity demand shows that consumption will grow by 1.2 percent per year from 2010–2018, with peak demand growing an average of 1.3 percent annually over the same period (CEC 2009, p. 3).

The RPS and RES (these documents have been incorporated by reference into this document, see Chapter 2, Project Description) require increased use of renewable energy sources such as solar, wind, and biofuels, but the availability of renewable energy sources is not sufficient to completely replace fossil fuels. Energy efficiency standards and retrofitting facilities with modern equipment are some of the anticipated compliance responses to reduce fuel use and emissions.

G. Geology, Soils, and Minerals

1. Soils

The United States has a diverse, complex and seismically active geology that includes a vast array of landforms. Soils are as diverse as America's geology, and are described and characterized individually and collectively with other soils, and their various compatible uses in soil surveys published by the U.S. Department of Agriculture. Soils are fundamental and largely non-renewable resources that are the basis for high-level sustained yields of agricultural commodities, forest products, and provide support to the wide variety of ecological communities throughout the State.

2. Geology

The geology of the United States is very complex and can be divided into roughly five physiographic provinces: the American cordillera, the Canadian shield, the stable platform, the coastal plain, and the Appalachian orogenic belt. In Alaska, the geology is typical of the cordillera, whereas in Hawaii the major islands consist of Neogene volcanic erupted over a hotspot.

California's geologic history is associated with major episodes of tectonic activity including intrusive and extrusive volcanic activity, folding and faulting, and mountain building. The most recent period of mountain building is still going on, and practically all of the current landforms and geographic features are very young in geologic terms, only a few million years old. Rocks older than 600 million years, those of the Precambrian Era, are rare in California.

The oldest rocks, which are more than 1,000 million years old, are located in the eastern deserts and the eastern Transverse Ranges (San Bernardino and San Gabriel Mountains). The distribution of rocks of these ages suggests that the west coast of the North American Continent was well to the east of all but the southern end of what is now California. All of these very old formations have been extensively metamorphosed and, therefore, it is difficult to determine the conditions that existed when they were originally formed. Some of the oldest rocks (around 1,800 million years old) are located in the mountains around Death Valley and are much like the rocks exposed in the inner gorge of the Grand Canyon. Metamorphic rocks around 1,000 million years old are located in the San Gabriel Mountains and the Orocopia Mountains east of the Salton Sea. During the Paleozoic Era, beginning around 400 million years ago (mya), tectonic forces began the process of mountain building and appears to mark the first time the coast moved

west into most of what is now California, and the ancestral Sierra Nevada mountains were emplaced. During the Mesozoic Era between 245 to 65 mya, mountain building continued and the beginnings of the Coast Ranges were formed.

The Cenozoic Era, between 65 mya and the present, was marked with continued uplift, erosion and deposition. The Pacific plate became completely overridden by the North American plate forming the San Andreas Fault system, and in turn other faults. Volcanic activity became widespread in the Sierra Nevada and Mojave Desert regions, and a number of deep marine basins formed along the central and southern California coast. About 5 mya, mountain building accelerated resulting in the uplifting of most of the modern mountain ranges, including the Sierra Nevada and the large fault-block ranges to the east, the Coast Ranges, the Transverse Ranges, and the Peninsular Ranges. This was followed by Pleistocene glaciations in the Sierra Nevada and, to a minor extent, in the San Bernardino Mountains; recent volcanic eruptions in the Mojave Desert and Great Basin regions; and the widespread volcanic activity that created the southern Cascade volcanoes (Mt. Shasta and Mt. Lassen) and the lava flows of the Modoc Plateau region.

3. Mineral Resources

Mineral resources are all the physical materials that are extracted from the earth for use. Modern society is dependent on a huge amount and variety of mineral resources. Mineral resources are classified as metallic or non-metallic. As measured by consumption, the most important metallic resources are iron aluminum, copper, zinc and lead. The most important nonmetallic resources include crushed stone, sand and gravel, cement, clays, salt and phosphate. Mineral reserves are known deposits of minerals that can be legally mined economically using existing technology

The California Geological Survey (CGS), formerly the California Division of Mines and Geology, classifies the regional significance of mineral resources in accordance with the California Surface Mining and Reclamation Act (SMARA) of 1975 and assists the CGS in the designation of lands containing significant aggregate resources. Mineral Resource Zones (MRZs) have been designated to indicate the significance of mineral deposits. The MRZ categories follow:

- **MRZ-1:** Areas where adequate information indicates that no significant mineral deposits are present or where it is judged that little likelihood exists for their presence.

- **MRZ-2:** Areas where adequate information indicates significant mineral deposits are present, or where it is judged that a high likelihood exists for their presence.

- **MRZ-3:** Areas containing mineral deposits the significance of which cannot be evaluated from available data.
- **MRZ-4:** Areas where available information is inadequate for assignment to any other MRZ.

H. Greenhouse Gases

GHGs retain heat in the atmosphere, contributing to global warming. The proposed cap-and-trade regulation would establish a limit (cap) on the emission of GHG expressed in $MMTCO_2e$. Gases subject to the cap are CO_2, N_2O, CH_4, SF_6, HFCs, PFCs, and NF_3. $MMTCO_2e$ is calculated based on GWP. GWP is a scale that normalizes other GHGs based on the heat retention properties of CO_2, which is assigned a value of 1.0. The GWP and atmospheric lifetimes of the GHG subject to the cap-and-trade regulation are presented below.

GHG	GWP (100 year, SAR)	Atmospheric Lifetime (years)
Carbon Dioxide (CO_2)	1.0	Variable
Nitrous Oxide (N_2O)	310	120
Methane (CH_4)	21	12
Sulfur Hexafluoride (SF_6)	23,900	3,200
Hydrofluorocarbons (HFCs)	Each HFC has its own GWP characteristics, ranging from 140 years (HFC-152a) to 11,700 years (HFC-23).	Most HFCs have atmospheric lifetimes of less than 15 years. The atmospheric lifetime of HFC-152a is about 1-year while the lifetime of HFC-23 is 260 years.
Perfluorocarbons (PFCs)	The two most prolific anthropogenic PFCs are CF4 (tetrafluoromethane) and C2F6 (hexafluoroethane). The GWP of CF4 is 6,500 and the GWP of C2F6 is 9,200.	CF4 has an atmospheric lifetime of 50,000 years. C2F6 has an atmospheric lifetime of 10,000 years.
Nitrogen Trifluoride (NF_3)*	17,200*	740*

*Nitrogen Trifluoride is not included in the UNFCCC SAR

I. Hazards and Hazardous Materials

Hazardous materials are substances with physical properties that could pose a substantial present or future hazard to human health or the environment when improperly handled, disposed, or otherwise managed. Hazardous materials are grouped into four categories based on their properties: toxic (causes human health effects), ignitable (has the ability to burn), corrosive (causes severe burns or damage to materials) and reactive (causes explosions or generates toxic gases). A hazardous waste is any hazardous material that cannot be safely disposed in the trash or poured down sinks and storm drains. This includes items, such as fuels, industrial solvents and

chemicals, process water, and spent materials (e.g., pozzolans, foams). The California Hazardous Waste Control Law recognizes more than 780 hazardous chemicals and nearly 30 additional common materials that may be hazardous.

Naturally occurring hazardous materials in the United States include asbestos, radon, and mercury. Asbestos is a naturally occurring mineral composed of long, thin, fibrous crystals. It is often found in a type of rock (serpentine) located in the California Coast Ranges and Sierra foothills. Asbestos is found in 20 of the U.S. states and has been mined in 17 of these states, including the Appalachian region, California and Oregon (Asbetos.net, 2010). Mercury is a chemical element that comes from both natural sources and human activities. Natural sources of mercury include volcanoes, hot springs, and natural mercury deposits. Sources related to human activities include coal combustion and certain industrial and mining activities. Radon is a gas that forms during the decay of uranium that is naturally found in rock, water, and soil. It migrates to the surface through cracks or fractures in the Earth's crust.

J. Hydrology, Water Quality, and Supply

The United States has a very diverse climate due to its wide range of geographic features. The climate is temperate in the majority of the U.S., subtropical in the Southern region, tropical in Hawaii and in Florida, polar in Alaska, semi-arid in the Great Plains, arid in the Great Basin, and Mediterranean in California. U.S. weather is influenced by the polar jet stream. The Great Basin and Columbia Plateau are arid and semi-arid, with annual precipitation averaging less than 15 inches. From July to September monsoons and thunderstorms affect the Southwest and Great Basin region. The Cascades region is one of the snowiest places in the world, with some spots averaging over 600 inches of snow annually.

About 90 percent of public water systems in the U.S. obtain their water from groundwater. However, since systems served by groundwater tend to be much smaller than systems served by surface water, only 34% of Americans (101 million) are supplied with treated groundwater, while 66% (195 million) are supplied with surface water (USEPA, 2003)

California experiences a Mediterranean climate with cool, wet winters and warm, dry summers. Most precipitation (i.e., rain and snow) and peak stream runoff events occur primarily during October through April, and the most extreme events usually occur between November and March. Precipitation rates vary greatly across the state from northern to southern regions, and the state contains many desert regions where annual total precipitation is very low (i.e., less than about 6 inches). In mountainous areas, snowmelt can provide moderate to high runoff rates in the April to July period, and snowmelt generally contributes substantially to the seasonal and annual volume of water that is available for storage in reservoirs and sustained stream flows into the later summer months.

Many rivers are controlled by dams, reservoirs, and levees for a variety of purposes, including but not limited to, flood control, hydroelectric power generation, water storage and transport for municipal/domestic and agricultural water supply, recreation, and fish and wildlife uses. Most of the major rivers on the west side of the Sierra Nevada Mountains are controlled, to some degree, by large dams, reservoirs, and diversions and water conveyance canals. Smaller reservoirs are common at other locations throughout the state. Sierra Nevada Mountain runoff to the Sacramento River and San Joaquin River (i.e., approximately 25 million acre-feet [MAF] in above normal water year types) provides much of the surface water used in the state and managed and conveyed in State Water Project (SWP) and Central Valley Project (CVP) facilities operated by DWR and U.S. Bureau of Reclamation (U.S. BR), respectively (DWR 2009). Water from the Sacramento River and San Joaquin River flows into the Sacramento-San Joaquin Delta (Delta), where both the SWP and CVP operate pumps to export water to the southern portion of the state. California also conveys a substantial quantity of water from the Colorado River for agricultural uses in the Imperial Valley and Coachella Valley, and municipal uses in the Los Angeles region. Several large reservoirs are located in the Los Angeles and San Diego areas to store imported Delta and Colorado River water.

California contains vast quantities of groundwater in alluvial aquifers that cover approximately 40 percent of the land surface. Several large groundwater recharge and conjunctive use projects are part of the SWP/CVP operations to provide short-term and long-term sub-surface storage of surplus surface water for later withdrawal for municipal/agricultural uses . Groundwater pumping that exceeds the natural recharge can lead to “overdrafting”, which refers to long-term drawdown of groundwater table elevations.

Both groundwater and surface water are used extensively in California for agricultural, municipal, and industrial water supplies. Current annual municipal and industrial water use for the California population of approximately 35 million residents ranges from 10-12 MAF, with demands being lower in drought years when higher levels of conservation occur. Approximately 35 MAF is used for agricultural production. In years with average available surface water supply, groundwater meets about 30 percent of California’s urban and agricultural demand, increasing in drought years to about 40 percent or more. While water supplies typically have been sufficient to meet demands, significant water supply and water quality challenges exist at local levels, particularly during extreme drought year types when conservation and cutbacks for agriculture have occurred and the SWP/CVP operations are stressed to meet competing water demands and environmental requirements in the major rivers and Delta.

K. Land Use and Planning

The manner in which physical landscapes are used or developed is commonly referred to as land use. Public agencies are the primary entities that determine the types of land use changes that can occur for specific purposes within their authority or jurisdiction. In most states, land uses decisions are made by local governments. In incorporated areas, land use decisions are typically made by the city. In unincorporated areas, land use decisions are typically made by the county. Sometimes other agencies, such as the California Coastal Commission, State Lands Commission, or federal land management agencies also make land use decisions.

Generally, state law establishes the framework for local planning procedures, which local governments follow in adopting their own set of land use policies and regulations in response to the unique issues they face. As an example, in California, the State Planning and Zoning Law (California Government Code section 65000 et seq.) provides most of the legal framework local governments must follow in land use planning. Regulatory tools provided by the California Planning and Zoning Law include the following:

- **General Plan –** the general plan is a city or county's basic planning document. It provides the blueprint for development regarding the location of housing, business, industry, road, parks and other land uses, protection of the public from noise and other environmental hazards, and conservation of natural resources. State law requires general plans to include the following seven "elements": land use, circulation, housing, conservation, open-space, noise, and safety. At the same time, each jurisdiction is permitted to adopt additional elements covering subjects of particular interest to that jurisdiction, such as recreation, public facilities, or economic development. The legislative body of each city (the city council) and each county (the board of supervisors) adopts zoning, subdivision and other ordinances to regulate land uses and carry out the policies of the general plan. Specific plans, zoning ordinances, subdivisions, public works projects, and development agreements must be consistent with the general plan.

- **Specific Plan –** the specific plan is a step below the general plan in the land use approval hierarchy and is used to implement the general plan in particular geographic areas. Specific plans describe allowable land uses, identify open space, and detail the availability of facilities and financing for a portion of the community. Specific plans must be consistent with the general plan. Zoning ordinances, subdivisions, public works projects, and development agreements must be consistent with the specific plan.

- **Subdivisions –** In general, land cannot be divided in California without local government approval. Dividing land for sale, lease or financing is regulated by local ordinances based on the state Subdivision Map Act (Government Code section 66410 et seq.). The primary goals of the Subdivision Map Act are: (a) to encourage orderly community development by providing for the regulation and control of the

design and improvements of the subdivision with a proper consideration of its relation to adjoining areas; (b) to ensure that the areas within the subdivision that are dedicated for public purposes will be properly improved by the subdivider so that they will not become an undue burden on the community; and (c) to protect the public and individual transferees from fraud and exploitation. (61 Ops. Cal. Atty. Gen. 299, 301 (1978); 77 Ops. Cal. Atty. Gen. 185 (1994)).

- **Zoning –** A zoning ordinance is the local law that spells out the immediate, allowable uses for each piece of property within the community. Zoning must comply with the general plan. Zoning ordinances group various types of land uses into general categories or "zones," such as single-family residential, commercial, industrial, agricultural, etc. Each piece of property in the community is assigned a zone listing the kinds of uses that will be allowed on that land and setting standards, such as minimum lot size and maximum building height.

L. Noise

1. Acoustic Fundamentals

Acoustics is the scientific study that evaluates perception, propagation, absorption, and reflection of sound waves. Sound is a mechanical form of radiant energy, transmitted by a pressure wave through a solid, liquid, or gaseous medium. Sound that is loud, disagreeable, unexpected, or unwanted is generally defined as noise; consequently, the perception of sound is subjective in nature, and can vary substantially from person to person.

A sound wave is initiated in a medium by a vibrating object (e.g., vocal chords, the string of a guitar, the diaphragm of a radio speaker). The wave consists of minute variations in pressure, oscillating above and below the ambient atmospheric pressure. The number of pressure variation cycles occurring per second is referred to as the frequency of the sound wave and is expressed in hertz.

Directly measuring sound pressure fluctuations would require the use of a very large and cumbersome range of numbers. To avoid this and have a more useable numbering system, the decibel (dB) scale was introduced. A sound level expressed in decibels is the logarithmic ratio of two like pressure quantities, with one pressure quantity being a reference sound pressure. For sound pressure in air the standard reference quantity is generally considered to be 20 micropascals, which directly corresponds to the threshold of human hearing. The use of the decibel is a convenient way to handle the million-fold range of sound pressures to which the human ear is sensitive. A decibel is logarithmic; it does not follow normal algebraic methods and cannot be directly added. For example, a 65 dB source of sound, such as a truck, when joined by another 65 dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by 3 dB). A sound level increase of 10 dB corresponds to 10 times the acoustical energy, and an increase of 20 dB equates to a 100 fold increase in acoustical energy.

The loudness of sound perceived by the human ear depends primarily on the overall sound pressure level and frequency content of the sound source. The human ear is not equally sensitive to loudness at all frequencies in the audible spectrum. To better relate overall sound levels and loudness to human perception, frequency-dependent weighting networks were developed. The standard weighting networks are identified as A through E. There is a strong correlation between the way humans perceive sound and A-weighted sound levels (dBA). For this reason the dBA can be used to predict community response to noise from the environment, including noise from transportation and stationary sources. Sound levels expressed as dB in this section are A-weighted sound levels, unless noted otherwise.

Noise can be generated by a number of sources, including mobile sources (transportation noise sources) such as automobiles, trucks, and airplanes and stationary sources (nontransportation noise sources) such as construction sites, machinery, and commercial and industrial operations. As acoustic energy spreads through the atmosphere from the source to the receiver, noise levels attenuate (decrease) depending on ground absorption characteristics, atmospheric conditions, and the presence of physical barriers (walls, building façades, berms). Noise generated from mobile sources generally attenuate at a rate of 4.5 dB per doubling of distance. Stationary noise sources spread with more spherical dispersion patterns that attenuate at a rate of 6 to 7.5 dB per doubling of distance.

Atmospheric conditions such as wind speed, turbulence, temperature gradients, and humidity may additionally alter the propagation of noise and affect levels at a receiver. Furthermore, the presence of a large object (e.g., barrier, topographic features, and intervening building façades) between the source and the receptor can provide significant attenuation of noise levels at the receiver. The amount of noise level reduction or “shielding” provided by a barrier primarily depends on the size of the barrier, the location of the barrier in relation to the source and receivers, and the frequency spectra of the noise. Natural barriers such as berms, hills, or dense woods, and human-made features such as buildings and walls may be used as noise barriers.

2. Noise Descriptors

The intensity of environmental noise fluctuates over time, and several different descriptors of time-averaged noise levels are used. The selection of a proper noise descriptor for a specific source depends on the spatial and temporal distribution, duration, and fluctuation of both the noise source and the environment. The noise descriptors most often used to describe environmental noise are defined below.

- **Equivalent Noise Level (L_{eq}):** The energy mean (average) noise level.
- **Maximum Noise Level (L_{max}):** The highest A/B/C weighted integrated noise level occurring during a specific period of time.

- **Minimum Noise Level (L_{min}):** The lowest A/B/C weighted integrated noise level during a specific period of time.

- **Day-Night Noise Level (L_{dn}):** The 24-hour L_{eq} with a 10-dB "penalty" applied during nighttime noise-sensitive hours, 10 p.m. through 7 a.m.

- **Community Noise Equivalent Level (CNEL):** Similar to the L_{dn} described above, but with an additional 5-dB "penalty" for the noise-sensitive hours between 7 p.m. to 10 p.m., which are typically reserved for relaxation, conversation, reading, and watching television.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the L_{eq} descriptor listed above, which corresponds to a steady-state A-weighted sound level containing the same total energy as a time-varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptors such as L_{dn} and CNEL, as defined above, and shows very good correlation with community response to noise.

3. Effects of Noise on Humans

Excessive and chronic exposure to elevated noise levels can result in auditory and non-auditory effects on humans. Auditory effects of noise on people are those related to temporary or permanent hearing loss caused by loud noises. Non-auditory effects of exposure to elevated noise levels are those related to behavioral and physiological effects. The non-auditory behavioral effects of noise on humans are associated primarily with the subjective effects of annoyance, nuisance, and dissatisfaction, which lead to interference with activities such as communications, sleep, and learning. The non-auditory physiological health effects of noise on humans have been the subject of considerable research attempting to discover correlations between exposure to elevated noise levels and health problems, such as hypertension and cardiovascular disease. The mass of research infers that noise-related health issues are predominantly the result of behavioral stressors and not a direct noise-induced response. The extent to which noise contributes to non-auditory health effects remains a subject of considerable research, with no definitive conclusions.

The degree to which noise results in annoyance and interference is highly subjective and may be influenced by several non-acoustic factors. The number and effect of these non-acoustic environmental and physical factors vary depending on individual characteristics of the noise environment such as sensitivity, level of activity, location, time of day, and length of exposure. One key aspect in the prediction of human response to new noise environments is the individual level of adaptation to an existing noise environment. The greater the change in the noise levels that are attributed to a new noise source, relative to the environment an individual has become accustom to, the less tolerable the new noise source will be perceived.

With respect to how humans perceive and react to changes in noise levels, a 1 dB increase is imperceptible, a 3 dB increase is barely perceptible, a 6 dB increase is clearly noticeable, and a 10 dB increase is subjectively perceived as approximately twice as loud (Egan 1988). These subjective reactions to changes in noise levels was developed on the basis of test subjects' reactions to changes in the levels of steady-state pure tones or broad-band noise and to changes in levels of a given noise source. It is probably most applicable to noise levels in the range of 50 to 70 dB, as this is the usual range of voice and interior noise levels. For these reasons, a noise level increase of 3 dB or more is typically considered substantial in terms of the degradation of the existing noise environment.

4. Vibration

Vibration is the periodic oscillation of a medium or object with respect to a given reference point. Sources of vibration include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) and those introduced by human activity (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, (e.g., operating factory machinery or transient in nature, explosions). Vibration levels can be depicted in terms of amplitude and frequency, relative to displacement, velocity, or acceleration.

Vibration amplitudes are commonly expressed in peak particle velocity (PPV) or root-mean-square (RMS) vibration velocity. PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is typically used in the monitoring of transient and impact vibration and has been found to correlate well to the stresses experienced by buildings (Federal Transit Administration [FTA] 2006, California Department of Transportation [Caltrans] 2004). PPV and RMS vibration velocity are normally described in inches per second (in/sec).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. The response of the human body to vibration relates well to average vibration amplitude; therefore, vibration impacts on humans are evaluated in terms of RMS vibration velocity. Similar to airborne sound, vibration velocity can be expressed in decibel notation as vibration decibels (VdB). The logarithmic nature of the decibel serves to compress the broad range of numbers required to describe vibration.

Typical outdoor sources of perceptible groundborne vibration include construction equipment, steel-wheeled trains, and traffic on rough roads. Although the effects of vibration may be imperceptible at low levels, effects may result in detectable vibrations and slight damage to nearby structures at moderate and high levels, respectively. At the highest levels of vibration, damage to structures is primarily architectural (e.g., loosening and cracking of plaster or stucco coatings) and rarely results in damage to structural components. The range of vibration that is relevant to this analysis occurs from approximately 50 VdB, which is the typical background vibration-velocity level, to

100 VdB, which is the general threshold where minor damage can occur in fragile buildings (FTA 2006).

5. Existing Sources and Sensitive Land Uses

The existing noise environment in the project area is primarily influenced by transportation noise from vehicle traffic on the roadway systems (e.g., highways, freeways, primary arterials, and major local streets) and non-transportation noise from commercial and industrial operations. Other noise sources that contribute to the existing noise environment include passenger and freight on-line railroad operations and ground rapid transit systems; commercial, general aviation, heliport, and military airport operations (e.g., jet engine test stands, ground facilities and maintenance) and overflights; and to a much lesser extent construction sites, schools (e.g., play fields), residential and recreational areas (e.g., landscape maintenance activities, dogs barking, people talking), agricultural activities, and others. Those noted above are also considered sources of vibration in the project area. With regards to the covered entities, existing noise conditions vary depending on location, but are typically characterized as noisy urban industrial areas including such noise sources as stationary machinery, transportation (e.g., surface vehicles, heavy-duty diesel trucks, construction equipment), and other industrial-related activities. Table 3-4 shows typical ambient noise levels based on population density.

Table 3-4
Population Density and Associated Ambient Noise Levels

	dBA, L_{dn}
Rural	40-50
Suburban	
Quiet suburban residential or small town	45-50
Normal suburban residential	50-55
Urban	
Normal urban residential	60
Noisy urban residential	65
Very noise urban residential	70
Downtown, major metropolis	75-80
Under flight path at major airport, ½ to 1 mile from runway	78-85
Adjoining freeway or near a major airport	80-90

Notes: A-Weighted Decibel (dBA). An overall frequency-weighted sound level in decibels which approximates the frequency response of the human ear. Day-Night Level (Ldn).
Sources: (Hoover and Keith 1996 and Cowan, James P. 1984)

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Additional land uses such as parks, historic sites, cemeteries, and recreation areas are also generally considered sensitive to increases in exterior noise levels. Places of worship and transit lodging, and other places where low interior noise levels are essential are also considered noise-sensitive.

Those noted above are also considered vibration-sensitive land uses in addition to commercial and industrial buildings where vibration would interfere with operations within the building, including levels that may be well below those associated with human annoyance. Equipment such as electron microscopes and high-resolution lithographic equipment can be very sensitive to vibration, and even normal optical microscopes will sometimes be difficult to use when vibration is well below the human annoyance level. Manufacturing of computer chips is an example of a vibration-sensitive process. This category does not include most computer installations or telephone switching equipment because most such equipment is designed to operate in typical building environments where the equipment may experience occasional shock from bumping and continuous background vibration caused by other equipment (FTA 2006).

M. Employment, Population, and Housing

The employed civilian labor force, unemployment rates, employment opportunities, and population estimates and projections for cities, counties, and states are collected every ten years by the U.S. Census Bureau (Census). The California Employment Development Department (EDD) collects statistics specific to California annually.

The California Department of Housing and Community Development (CDHCD) defines a housing shortage as a vacancy rate of less than 5 percent. The vacancy rate is the percentage of total owner-occupied residential units that are for sale and not occupied. Data on housing availability and vacancy rates are collected by the U.S. Census Bureau (Census). The Census data excludes residential units that are not occupied and not for sale from the vacancy rate calculation; therefore the number of number of vacant residential units that are not occupied and for sale is reported and the number of residential units that are not occupied and not for sale is not reported.

N. Public Services

1. Law Enforcement

In the United States, the Federal Bureau of Investigation (FBI) is an agency of the United States Department of Justice that serves as both a federal criminal investigative body and an internal intelligence agency. The FBI's main goal is to protect and defend the United States against terrorist and foreign intelligence threats, to uphold and enforce the criminal laws of the United States, and to provide leadership and criminal justice services to federal, state, municipal, and international agencies and partners. The U.S. Environmental Protection Agency (EPA or sometimes USEPA) is an agency of the federal government of the United States charged with protecting human health and the environment, by writing and enforcing regulations based on laws passed by Congress. The Environmental Protection Agency's Criminal Investigation Division (EPA CID) primary mission is the enforcement of the United States' environmental laws as well as any other federal law in accordance with the guidelines established by the Attorney General of the United States (18 U.S.C. 3063). These environmental laws include those specifically related to air, water and land resources.

Statewide law enforcement service is provided by the California Highway Patrol (CHP). The CHP is responsible for protecting state resources and providing crime prevention services and traffic enforcement along the State’s highways and byways.

Local law enforcement service is also provided by local agencies (i.e., cities and counties) to prevent crime, respond to emergency incidents, and provide traffic enforcement on local roadways.

Some of the offset projects would occur in other states or countries (e.g., Canada). It is expected that similar law enforcement services (i.e., state/provincial and/or local) are offered in these jurisdictions as are offered in California.

2. Fire Protection and Emergency Medical Response Services

The United States Forest Service is an agency of the United States Department of Agriculture that administers the nation's 155 national forests and 20 national grasslands, which encompass 193 million acres (780,000 km2). Major divisions of the agency include the National Forest System, State and Private Forestry, and the Research and Development branch. The Fire and Aviation Management part of the US Forest Service works to advance technologies in fire management and suppression, maintain and improve the extremely efficient mobilization and tracking systems in place, and reach out in support of our Federal, State, and International fire partners.

Statewide fire protection and emergency response service is provided by the California Department of Forestry and Fire Protection (CAL FIRE). CAL FIRE is an emergency response and resource protection department. CAL FIRE protects lives, property and

natural resources from fire, responds to emergencies of all types, and protects and preserves timberlands, wildlands, and urban forests.

Local fire protection service is provided by local fire districts and/or local agencies (e.g., fire departments of cities and counties). In addition to providing fire response services most fire agencies also provide emergency medical response services (i.e., ambulance services) within their service areas.

Some of the offset projects would occur in other states or countries (e.g., Canada). It is expected that similar fire protection and emergency medical response services (e.g., state/provincial and local) are offered in these jurisdictions as offered in California.

3. Schools

Education is primarily a state and local responsibility in the United States. States and communities, as well as public and private organizations, establish schools, develop curricula, and determine requirements for enrollment and graduation. (U.S. Dept. of Education website, accessed October 15, 2010). Statewide, the regulation of education for youth is provided by the California Department of Education. The State Board of Education (SBE) is the governing and policy-making body of the California Department of Education. The SBE sets K-12 education policy in the areas of standards, instructional materials, assessment, and accountability (California State Board of Education website, date accessed May 14, 2010).

Locally, school districts are responsible for the management and development of elementary, middle, and high-school facilities. Throughout California there are 1,039 school districts.

Some of the offset projects would occur in other states or countries (e.g., Canada). While the specific organization and provision of education services may vary by area, it is anticipated that these out-of-state jurisdictions would offer similar educational services to those provided in California.

O. Recreation

Recreational resources and facilities are provided and managed at federal, state, and local levels. The federal government manages a diverse array of recreational facilities and resources in California that include national parks and monuments, national forests and grasslands, wildlife refuges, wilderness areas, lakes and lands managed by different agencies in the federal government, wild and scenic rivers, and back country byways, national trials, and marine reserves and estuaries. The U.S. FWS manages the wildlife and fisheries resources and their habitats. Each federal agency's programs include recreation components.

California has over 275 state beaches and parks, recreation areas, wildlife areas, historic parks, and museums, and has authority over fishing and hunting activities,

habitat restoration and protection in the state. Statewide master plans for parks, outdoor recreation, and open space are publicly available. For example, the California Outdoor Recreation Plan and associated research provide policy guidance to all public agencies – federal, state, local, and special districts that oversee outdoor recreation on lands, facilities and services throughout California Agencies and departments that have involvement in recreational activities include Boating and Waterways, Fish and Game, Tahoe Regional Planning Association, various conservancies, and others.

Recreational lands and facilities are also managed by local agencies. County General Plans contain recreation elements that provide framework for planning agencies to consider when projects are developed and implemented.

P. Transportation and Traffic

Existing roadway systems in-state and in out-of-state areas generally consist of highways, freeways, arterials, local streets, and intersections/ramps. The existing average annual daily traffic (AADT) volumes on the roadway segments that comprise these systems vary considerably (i.e., from hundreds to hundreds of thousands). The level of service (LOS), a scale used to determine the operating quality of a roadway segment or intersection based on volume-to-capacity ratio (V/C) or average delay, also vary from LOS A, the best and smoothest operating conditions, to LOS F, most congested operating conditions. Other roadway and traffic volume characteristics such as roadway length, number of lanes and facility type (e.g., two-lane freeway), right-of-way width and pavement width, terrain classification (e.g., flat), percent of heavy-duty truck traffic, and accident rates (e.g., number of accidents per million vehicle miles traveled) also vary substantially depending on the location. In addition to the roadway systems, circulation networks provide additional transportation opportunities and include mass transit, airports, and non-motorized travel (e.g., pedestrian and bicycle paths).

Q. Utilities and Service Systems

1. Water Supply and Distribution

Statewide principal water supply sources are regulated by the USBR and DWR. The USBR is a federal agency and it is the largest wholesaler of water in the U.S. and the second largest producer of hydroelectric power (USBR 2010). In California, the Mid-Pacific Region of the USBR is responsible for the management of the Central Valley Project (CVP). The CVP serves farms, homes, and industry in California's Central Valley as well as the major urban centers in the San Francisco Bay Area. The CVP consists of 20 dams and reservoirs, 11 power plants, and 500 miles of major canals and reaches from the Cascade Mountains near Redding in the north to the Tehachapi Mountains near Bakersfield in the south. In addition to delivering water for municipal and industrial uses and the environment, the CVP produces electric power and provides flood protection, navigation, recreation, and water quality benefits (USBR 2010).

DWR is a State agency that is responsible for managing and implementing the State Water Project (SWP). The SWP is a water storage and delivery system of reservoirs, aqueducts, power plants and pumping plants. Its main purpose is to store water and distribute it to 29 urban and agricultural water suppliers in Northern California, the San Francisco Bay Area, the San Joaquin Valley, the Central Coast, and Southern California (DWR 2010).

Local water supply districts, special districts, and jurisdictions (e.g., cities and counties) manage and regulate the availability of water supplies and the treatment and delivery of water to individual projects. Depending on their location and the source of their supplies, these agencies may use groundwater, surface water through specific water entitlements, or surface water delivered through the CVP or SWP. In some remote areas not served by a water supply agency, individual developments may need to rely upon the underlying groundwater basin for their water supply. In these cases, the project would be required to secure a permit from the local land use authority and seek approval for development of the groundwater well(s).

Some of the offset projects would be located in other states. While the specific organization and provision of water supply and distribution services may vary by area, it is anticipated that these out-of-state jurisdictions would offer similar services and would have similar laws and policies regulating their implementation.

2. Wastewater Collection and Treatment

The California State Water Resources Control Board (SWRCB) is the State agency responsible for the regulation of wastewater discharges to surface waters and groundwater via land discharge. The SWRCB and nine regional water quality control boards (RWQCB) are responsible for development and enforcement of water quality objectives and implementation plans that protect the beneficial uses of the federal and state waters. (SWRCB 2010) The water boards also administer water rights in California. The RWQCB's are responsible for issuing permits or other discharge requirements to individual wastewater dischargers and for ensuring that they are meeting the requirements of the permit through monitoring and other controls.

Wastewater collection, treatment, and discharge service for developed and metropolitan areas is typically provided by local wastewater service districts or agencies that may or may not be operated by the local jurisdiction (e.g., city or county). These agencies are required to secure treatment and discharge permits for the operation of a wastewater facility from the RWQCB. Wastewater is typically collected from a specific development and conveyed through a series of large pipelines to the treatment facility where it is treated to permitted levels and discharged to surface waters or the land.

In areas that are remote or that are not served by an individual wastewater service provider, developments would be required to install an individual septic tank or other on-site wastewater treatment system. These facilities would need to be approved by the local land use authority and the RWQCB.

Some of the offset projects would be located in other states. It is anticipated that similar wastewater services (e.g., state and local) are offered in these jurisdictions.

3. Electricity and Natural Gas

The CPUC regulates investor-owned electric and natural gas companies located within California. The CPUC's Energy Division develops and administers energy policy and programs and monitors compliance with the adopted regulations. One-third of California's electricity and natural gas is provided by one of three companies: Pacific Gas and Electric Company, Southern California Edison, San Diego Gas and Electric Company (CPUC 2010).

Locally, energy service is provided by a public or private company. New development projects would need to coordinate with the local service provider to ensure adequate capacity is available to serve the development.

Some of the offset projects would be located in other states. It is anticipated that similar electricity and natural gas services (e.g., state and local) are offered in these jurisdictions.

4. Solid Waste Collection and Disposal

Statewide, the California Department of Resources Recycling and Recovery (CAL Recycle), which is a department of the newly formed California Natural Resources Agency (CNRA), is responsible for the regulation of the disposal and recycling of all solid waste generated in California. Cal Recycle acts as an enforcement agency in the approval and regulation of solid waste disposal and recycling facilities. Local agencies can create local enforcement agencies (LEA) and once approved by Cal Recycle they can serve as the enforcement agency for landfills and recycling facilities with their jurisdictions (Cal Recycle 2010).

Local agencies or private companies own and operate landfill facilities and solid waste is typically hauled to these facilities by private or public haulers. Individual projects would need to coordinate with the local service provider and landfill to determine if adequate capacity exists to serve the project.

Some of the offset projects would be located in other states. It is anticipated that solid waste collection and disposal services (e.g., state and/or local) are offered in these jurisdictions.

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4.0 IMPACT ANALYSIS

A. Introduction

The FED presents ARB's analysis of potential project impacts, indirect impacts, and cumulative impacts on the physical environment that may result from ARB's approval and implementation of the proposed cap-and-trade regulation and implementation of the cap-and-trade program. "Project impacts" in this FED are the environmental consequences potentially resulting from the actions that covered entities are expected to take to comply with the cap-and-trade regulation. Such actions would include reducing GHG emissions at their facilities, as well as obtaining allowances or offset credits.

As described in the impact analyses throughout this report, equipment upgrades or process changes are expected to occur at covered entities' facilities, often within existing structures; these upgrades or process changes are likely to reduce not only GHG emissions, but the emission of other pollutants. The use of offset credits could stimulate the development of offset projects consistent with the adopted offset protocols Depending on the individual protocol, offset projects could be located in California, or elsewhere in the U.S. In the future, ARB may adopt offset protocols applicable outside of the U.S., but the potential type or proposed locations are not known, so it is premature to provide any environmental impact analysis about possible future protocols.

This FED also identifies potential mitigation that could feasibly be implemented to alleviate, minimize, or avoid any potentially significant environmental impacts. In addition, the FED provides information on beneficial environmental impacts where they would be relevant to ARB's decision on the proposed regulation and program.

The proposed project is a statewide regulatory program. Therefore, the impact analysis is necessarily programmatic and often qualitative in nature. CEQA Guidelines section 15168 defines a program EIR as:

> An EIR which may be prepared on a series of actions that can be characterized as one large project and are related either:
>
> (1) Geographically,
>
> (2) A logical parts in the chain of contemplated actions,
>
> (3) In connection with issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program, or
>
> (4) As individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways.

(Cal. Code Regs. tit. 14, §CEQA Guidelines Section 15168 [a]). An advantage to program EIRs is that ARB can analyze the effects of broad policy alternatives and programwide mitigation measures at an early stage in the process and avoid duplication of effort and paperwork (Id. at subd. [b]). A program EIR can also ensure consideration of cumulative impacts that might be slighted in a case-by-case analysis.

1. Scope of Analysis

When adopting a rule or regulation, Section 15187 of the CEQA Guidelines provides direction to ARB and certain other state agencies. It requires ARB to conduct "an environmental analysis of the reasonably foreseeable methods by which compliance with that rule or regulation will be achieved" (Cal. Code Regs., tit. 14, § 15187, subd. [a]). The analysis shall include reasonably foreseeable environmental impacts of the methods of compliance, reasonably foreseeable feasible mitigation measures relating to those impacts, and reasonably foreseeable alternative means of compliance that would avoid or eliminate the identified impacts (See id., subd. [c])). The analysis should not engage in speculation; nor is the detail of a project-level analysis required (See id., subd. (d), [e]).

Section 15131(a) of the CEQA Guidelines also provides direction, and states that:

> An EIR may trace a chain of cause and effect from a proposed decision on a project through anticipated economic or social changes resulting from the project to physical changes caused in turn by the economic or social changes. The intermediate economic or social changes need not be analyzed in any detail greater than necessary to trace the chain of cause and effect. The focus of the analysis shall be on the physical changes.

(Cal. Code Regs., tit. 14, § 15131, subd. [a]). Consistent with CEQA Guidelines Sections 15131(a), and 15187, this impact analysis focuses on the physical changes and consequent environmental impacts that could result from reasonably foreseeable compliance responses.

Compliance responses are actions undertaken by covered entities to satisfy their surrender obligations. Compliance responses include actions that reduce GHG emissions and obtaining allowances or offset credits. For the purposes of this FED, the least expensive compliance responses are expected to be the initial actions undertaken by covered entities. Implementation of more expensive compliance responses would typically be expected only after less costly options have been exhausted. Nonetheless, the cap-and-trade regulation does not stipulate how an entity must comply, and it is possible that individual entities may choose to implement other responses for any number of reasons deemed more important than cost.

The majority of compliance responses are expected to occur within California at facilities subject to the cap-and-trade regulation. However, recognizing that compliance responses would be influenced by cost, the availability of a large supply of less

expensive offset projects could entice entities to purchase a greater number of offset credits than might otherwise be obtained. It could also incent covered entities to seek offset credits from projects in other states, which may involve environmental impacts. Out-of-state environmental impacts are discussed in the FED where the effects are reasonably foreseeable and not speculative. Some compliance responses by covered entities that fall within the realm of the cap-and-trade regulation may require federal action, although the specific actions that may occur are not yet reasonably foreseeable.

Finally, in many cases future actions cannot be definitively predicted at this time, and CEQA allows for forecasting, but discourages speculation (Cal. Code Regs., tit. 14, §§ 15144 and 15145). While foreseeing the unforeseeable is not possible, an agency must make a good faith effort to find out and disclose all that it reasonably can about potentially significant environmental impacts. If after thorough investigation, a lead agency finds that a particular impact is too speculative for evaluation, the agency should note its conclusion and terminate discussion of the impact.

2. Basis for Analysis and Significance Determinations

a. Existing Conditions

CEQA requires that the baseline for determining significance of environmental impacts normally should be the existing physical conditions at the time the environmental review is initiated. (Cal. Code Regs., tit. 14, § 15125, subd. (a).) For purposes of this FED's environmental analysis, existing conditions are characterized by available data from 2010, including the statewide GHG emission level of 362 $MMTCO_2e$ calculated by ARB staff. This approach complies with CEQA guidelines requirements for the definition of baseline conditions. The existing conditions include existing SIP programs, Pavley I, and RPS. "Existing conditions" projected to 2020 is 507 $MMTCO_2e$.

b. Significance Determination

The reasonably foreseeable methods of compliance under the cap-and-trade regulation are compared with the expected responses to other existing regulations and policies to determine the potential environmental effects attributable to cap-and-trade. The significance determinations reflected in this FED are based on changes from existing physical conditions and are consistent with CEQA requirements. Environmental changes resulting from compliance responses to existing regulations and programs are expected to occur regardless of the proposed cap-and-trade regulation. For example, many of the Scoping Plan measures are already underway and would not be expected to change as a result of cap-and-trade.

The significance determinations further reflect the programmatic nature of the analysis of the reasonably foreseeable methods of compliance, e.g., efficiency, conservation, de-carbonizing measures, and process changes that translate to changes in operations, equipment, and fuel choice, among others. Because of this, the FED analysis addresses broadly defined types of impacts without the ability to determine the specific project locations, facility size and character, or site-specific environmental characteristics affected by the facilities. As a result, some impact issues are determined

to be potentially significant, because of the inherent uncertainties about the relationship between future compliance projects and environmentally sensitive resources or conditions. This is a conservative approach (i.e., tending to overstate environmental impacts), in light of these uncertainties, to satisfy the good-faith, full-disclosure purpose of CEQA. When specific projects are proposed and subjected to project-level environmental review (where applicable), it is expected that many of the impacts recognized as potentially significant in this FED can be avoided or maintained at a less than significant level.

Another inherent uncertainty in the FED analysis is the degree of implementation of mitigation for potentially significant impacts. While ARB is responsible for adopting cap-and-trade as a regulation, it does not have authority over the proposal, approval, or implementation of specific compliance actions for GHG reduction to comply with the cap-and-trade regulation. Other agencies are responsible for the review and approval of specific projects, and if applicable, environmental analysis of proposed compliance actions, definition and adoption of project-specific feasible mitigation, and monitoring of mitigation implementation.

Consequently, the FED takes the conservative approach in its post-mitigation significance conclusions (i.e., tending to overstate the risk that feasible mitigation may not be sufficient or may not be implemented by other parties) and discloses, for CEQA compliance purposes, whether potentially significant environmental impacts may be unavoidable. Each compliance response project implemented by a covered entity in California, offset protocol adopted by ARB, or linkage agreement approved by ARB, that constitute a “project” as defined by CEQA, section 21065, would be subject to CEQA environmental review. It is expected that compliance response projects and offset projects would be able to feasibly avoid or mitigate to a less than significant level many of these potentially significant impacts as an outcome of their project-specific environmental review processes.

c. CEQA Environmental Checklist Criteria

Appendix G of the CEQA Guidelines provides an environmental checklist that includes criteria used to identify and evaluate potential project, indirect, and cumulative impacts of the compliance responses expected as a result of the cap-and-trade regulation. For purposes of this analysis, the criteria identified in the Checklist serve as a basis for ARB’s determination of significance to the resource areas identified below:

Aesthetics

The proposed cap-and-trade program would result in a significant impact related to aesthetic and scenic resources if implementation of the regulation would:

- Create a substantial adverse effect on a scenic vista;
- Substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway;

- Substantially degrade the existing visual character or quality of the site and its surroundings; or

- Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

Agriculture And Forest Resources

The proposed cap-and-trade program would result in a significant impact related to agricultural and forest resources if implementation of the regulation would:

- 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 nonagricultural use or involve other changes in the existing environment, which, due to their location, could result in the conversion of farmland to non-agriculture use; or

- Conflict with existing zoning for agricultural use or a Williamson Act contract;

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

- Result in the loss of forest land or conversion of forest land to non-forest use.

Air Quality

The proposed cap-and-trade program would result in a significant impact related to air quality if implementation of the regulation would:

- Conflict with or obstruct implementation of the applicable air quality plan;

- Violate any air quality standard or contribute substantially to an existing or projected air quality violation;

- Result in a cumulatively considerable net increase of any criteria air pollutant for which the project region is non-attainment under an applicable national or California AAQS;

- Expose sensitive receptors to substantial pollutant concentrations; or

- Create objectionable odors affecting a substantial number of people.

Biological Resources

The proposed cap-and-trade program would result in a significant impact related to biological resources if implementation of the regulation would result in any of the conditions listed below:

- Have a substantial adverse effect, either directly or through habitat modification, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations or by the DFG or USFWS;
- Have a substantial effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by CDFG or USFWS;
- Have a substantial adverse effect on federally protected wetlands, as defined by CWA Section 404 (including, but not limited to, marshes, vernal pools, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- 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;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance;
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan; or
- 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, or substantially reduce the number or restrict the range of an endangered, rare, or threatened species.

Cultural Resources

The proposed cap-and-trade program would result in a significant impact related to archaeological or historic resources if implementation of the regulation would:

- Physically damage, destroy, or alter all or part of a resource;
- Alter characteristics of the surrounding environment that contribute to the resource's significance;
- Neglect the resource to the extent that it deteriorates or is destroyed.
- Damage or destroy a resource during the accidental discovery of cultural resources during construction.

Energy Demand

The proposed cap-and-trade program would result in a significant impact related to energy demand if implementation of the regulation would:

- Conflict with adopted energy conservation plans
- Result in the need for new or substantially altered power or natural gas utility systems
- Create any significant effects on peak and base period demands for electricity and other forms of energy
- Be out of compliance with existing energy standards.

Geology, Soils and Minerals

The proposed cap-and-trade program would result in a significant impact related to geology, soils, and minerals if implementation of the regulation would:

- 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 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.)

  ii) Strong seismic ground shaking

  iii) Seismic-related ground failure, including liquefaction

  iv) Landslides

- Result in substantial soil erosion or the loss of topsoil
- 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
- Be located on expansive soil, as define in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property
- Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general land, specific plan or other land use plan.

Greenhouse Gases

The proposed cap-and-trade program would result in a significant impact related to greenhouse gases if implementation of the regulation would:

- Generates GHG emissions either directly or indirectly that may have a significant impact on the environment
- Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing emissions of GHGs.

Hazards and Hazardous Materials

The proposed cap-and-trade program would result in a significant impact related to hazards and hazardous materials if implementation of the regulation would:

- Create a significant hazard through the routine transport, use, or disposal of hazardous materials;
- Result in a hazardous emissions release within one quarter mile of an existing or proposed school;
- Be located within an area that is included on a hazardous materials list compiled pursuant to Government Code Section 65962.5;
- Result in safety hazards associated with being located within two miles of a public or private airport or location within an adopted Airport Land Use Plan;
- Conflict with an adopted emergency response plan; or
- Expose people or structures to substantial risk of loss, injury, or death involving wildland fires.

Hydrology and Water Quality

The proposed cap-and-trade program would result in a significant impact related to hydrology and water quality if implementation of the regulation would:

- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge, resulting in 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 that would not support existing land uses or planned uses for which permits have been granted);
- 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 that would result in substantial erosion or siltation on site or off site;

- 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 that would result in flooding on site or off site;

- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems;

- Place within a 100-year flood hazard area structures that would impede or redirect flood flows;

- 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;

- Create or contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff;

- Cause exceedance of applicable state or federal numeric or narrative water quality objectives/criteria, or other relevant water quality thresholds identified for this assessment, by frequency, magnitude, and geographic extent that would result in adverse effects to beneficial uses;

- Cause long-term degradation of water quality, resulting in substantial risk of adverse effects to beneficial uses;

- Be inundated by seiche, tsunami, or mudflow.

Land Use and Planning

The proposed cap-and-trade program would result in a significant impact related to land use if implementation regulation would:

- Physically divide an established community;

- 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; or

- The potential for the cap-and-trade program to result in conflicts with an adopted habitat conservation plan or natural community conservation plan are discussed in Section 4.D, Biological Resources.

Noise

The proposed cap-and-trade program would result in a significant impact related to noise (and vibration) if implementation of the regulation would:

- Generate short-term construction or long-term operational noise (including vibration) levels in excess of applicable standards or that result in a substantial increase in ambient levels at nearby sensitive receptors; or

- Expose people residing or working in the project area to excessive noise levels, for a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, or within the vicinity of a private airstrip.

Employment Population and Housing

The proposed cap-and-trade program would result in a significant impact related to employment, population, and housing if implementation of the regulation would:

- 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 infrastructure);

- Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere; or

- Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

Public Services

The proposed cap-and-trade program would result in a significant impact related to public services if implementation of the regulation would:

- Result in a substantial adverse physical impacts associated with the provision of new or physically altered governmental facility, or need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, to maintain acceptable capacity, service ratios, response times, or other performance objectives for any of the following:

    - Law enforcement

    - Fire protection

    - Emergency medical response

    - Schools

Recreation

The proposed cap-and-trade program would result in a significant impact related to recreation if implementation of the regulation would:

- 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;

- Directly or indirectly disrupt activities in established federal, state, or local recreation areas and/or wilderness areas or the values that contribute to their recreational quality;

In the context of the cap-and-trade program, the consequences that could lead to a significant increase in use of other recreational facilities would be the displacement of existing outdoor recreation resources or use, disruption or division of lands designated for or supporting outdoor recreation opportunities or use, or interference with accessibility to outdoor recreation resources.

Transportation and Traffic

The proposed cap-and-trade program would result in a significant impact related to transportation and traffic if implementation of the regulation would:

- 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;

- 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;

- 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;

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

- Result in inadequate emergency access; or

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

Utilities and Service Systems

Implementing the cap-and-trade regulation would result in a significant impact related to public services, utilities, and solid waste services if it would:

- Result in a substantial adverse physical impacts associated with the provision of new or physically altered governmental facility, or need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, to maintain acceptable capacity, service ratios, or other performance objectives for any of the following:
- Solid waste facilities
- Electricity
- Natural Gas
- Wastewater services
- Water supply services
- Create a water supply demand in excess of existing entitlements and resources;
- Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board (RWQCB);
- Violate state, federal, or local statues or regulations related to solid waste

3. Indirect Impacts

CEQA Guidelines Section15064(d)(2) and (3) were used as the basis for identifying indirect environmental impacts resulting from with the proposed cap-and-trade regulation, which indicates:

- (2) An indirect physical change in the environment is a physical change in the environment which is not immediately related to the project, but which is caused indirectly by the project.
- (3) An indirect physical change is to be considered only if that change is a reasonably foreseeable impact which may be caused by the project. A change which is speculative or unlikely to occur is not reasonably foreseeable.

4. Approach to Evaluation of Localized Impacts

The Emissions Assessment for the cap-and-trade program includes a community assessment, which is incorporated by reference in this FED. The assessment focuses on changes in emissions that may be expected as a result of cap-and-trade. Although localized impacts may result in other resource areas under CEQA, the primary focus of cap-and-trade affects air quality, and a more detailed analysis is provided in that section.

Assessments were conducted for four communities in California. The areas selected all have a number of major industrial pollution sources located in their community that would be subject to the proposed regulation. The choice of communities captures the diverse nature of California's air quality problems, as well as range of sources that would be subject to the program. Because of this diversity, the assessment for each community focuses on the nature of the local air quality problem and the local sources, including those expected to be subject to the program. Reductions in criteria pollutants as a result of GHG reductions from the transportation fuel and commercial/residential natural gas sectors were factored in, and these reductions are further explained in the Emissions Assessment.

- Wilmington and Richmond are two cities that are part of larger metropolitan areas in southern and northern California. They are located among a nexus of major transportation corridors, large refineries and other industrial facilities, and busy international ports. The concentration of emission sources contribute to air quality problems in the local community, as well as downwind areas. Both Wilmington and Richmond have a large number of industrial facilities that would be subject to the program.

- The Bakersfield region of the Central Valley has a mix of sources ranging from agricultural operations to widely dispersed stationary sources. The area also has a significant amount of mobile source emissions, resulting from its location along the two interstate highways connecting northern and southern California. The Bakersfield region has one of the most severe air quality problems in the nation.

- The Oro Grande community is located in the high Mojave Desert and includes the moderately sized towns of Hesperia and Victorville. Local air pollution sources are primarily mineral extraction and related commercial activities. This area has a small number of sources that would be subject to the program. The local air quality problem is primarily result the community's proximity to the South Coast from which pollution blows in.

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B. Covered Entity Compliance Responses

1. Compliance Response Descriptions

Compliance responses are actions undertaken by covered entities to satisfy their surrender obligations. This FED presents a programmatic evaluation that describes reasonably foreseeable impacts and does not speculate as to all of the possible iterations of compliance responses that could occur at the site- or project-specific level.

It is not possible to know with a reasonable level of certainty the specific actions that would be selected by covered entities to comply with their respective surrender obligations, or if offsets are used, specifically where those projects would occur. Individual facilities may choose other compliance responses that could result in different project impacts. For the purposes of this FED, the least expensive compliance responses are expected to be implemented by covered entities and are treated as representative of an entire business sector, e.g. upgrading equipment represents the initial compliance response for all glass manufacturing facilities.

The following compliance responses have been selected as reasonably foreseeable actions and provide the basis for a reasoned, good-faith assessment of potential, significant environmental impacts of the proposed regulation. Most GHG emissions are the product of fuel combustion. Accordingly, actions that reduce combustion emissions are prominent compliance responses. The reasonably foreseeable compliance responses recognized by this analysis include: (1) Upgrade Equipment, (2) Decarbonization, (3) Implement Process Changes, and (4) Surrender Compliance Instruments.

a. Upgrade Equipment

The decision to upgrade and/or replace aging equipment in an industrial setting is affected by business considerations and changing conditions. As a consequence, timely repairs and/or replacement of aging equipment that would improve fuel efficiency or reduce emissions may be delayed.

Replacing aging equipment with modern counterparts, sealing leaks, increasing insulation, and modifying facility design to maximize heat containment and conveyance to the desired medium (cement, glass, steel, etc.) improve the overall efficiency of the combustion and heating process and reduce the amount of fuel required by boilers, furnaces, ovens, kilns, and similar equipment used to generate heat for industrial processes. In some applications, the replacement of traditional boilers with cogeneration systems provides greater benefit (CHP) while producing fewer emissions.

Replacing combustion equipment achieves emission reductions through increased efficiency and reduced fuel use. Emissions may also be reduced through the installation of exhaust capture and treatment devices. Where necessary, most facilities already operate emission control devices, such as scrubbers, to eliminate specific

emissions. Installation or upgrading of emission control equipment can reduce GHG emissions.

The Iron and Steel Manufacturing covered entity is expected to implement this compliance response. It is feasible that advanced exhaust treatment systems could be considered by other covered entities with substantial combustion stack emissions such as electricity generators, refineries, hydrogen production, cement manufacture, etc., but such improvements have not been identified as the most reasonable compliance response in those sectors.

Petroleum refineries, oil and natural gas wells, and other facilities that process petroleum resources potentially benefit from the upgrading of steam traps, flaring equipment, fluid catalyst cracker turbines, low-emission regulator valves, and retrofitting or replacing internal combustion engines or turbines.

The covered entities expected to implement components of this response include Cement Manufacturing, CHP, Glass Production, Hydrogen Production, Iron and Steel Manufacturing, Lime Manufacturing, Oil and Natural Gas Systems, Petroleum Refineries, Pulp and Paper Production, Stationary Combustion, Electricity Generators, and Petroleum Refineries.

b. Decarbonization

Decarbonization is switching from carbon intensive fuels to fuels that contain less carbon, e.g. switching from coal to natural gas, or to alternative energy sources such as wind or solar energy that do not contain carbon. The advent of modern combustion technologies, development of cleaner fossil fuels, and introduction of clean energy sources can provide reasonable alternatives to the use of traditional carbon intensive fuels.

Coal, coke, and petcoke are traditional fuels used by industries because of their high heat content, long burning times, and relatively inexpensive costs. Cleaner fuels and renewable energy provide alternatives to the use of carbon-intensive fuels, but these alternatives have not fully matured and it is unrealistic to assume the use of traditional fuels could be replaced by newer technologies at this time. However, it is reasonable to expect that the use of cleaner alternative fuels is feasible and may be appropriate in some applications.

Natural gas is the most widely used fossil fuel that is relatively clean compared to more carbon intensive fuels such as coal. However, natural gas is more expensive and because of its lower BTU content is not particularly well-suited for applications that require extremely high temperatures for long durations.

Oxy-Fuel is a combination of oxygen and natural gas that provides higher combustion temperatures than natural gas alone, while using less natural gas and producing less GHG. In some applications where natural gas is already in use, switching to oxy-fuel may provide an acceptable alternative.

As a fuel, used tires provide high BTU content and long burning times. Modern combustion technology coupled and control systems are being developed to reduce the undesirable emissions of tire combustion. Some cement facilities in California have been permitted to combust used tires as fuel, but concerns about criteria air pollutant and TAC emissions likely discourage the widespread acceptance of this practice at this time. Depending on a range of considerations, it may be feasible for some covered entities to add used tires to their fuel combinations to reduce GHG emissions.

Although not yet available, the coal industry continues research and development of "clean coal" as a possible fuel of the future which would produce fewer GHG emissions than traditional coal.

Onsite generation of electricity from renewable sources such as solar and wind, or the installation of fuel cells to generate electricity can reduce GHG emissions if the electricity replaces energy that is generated onsite through fuel combustion. Increasing the amount of energy from renewable resources is incentivized by the RPS and the RES, and municipal utility companies may provide incentives to support the installation of such systems. Fuel cells are being successfully operated at numerous wastewater and food processing facilities in California to generate electricity from CH_4 produced by anaerobic digestion.

Opportunities to switch to less carbon intensive fuels may exist in Cement Manufacturing, CHP, Glass Production, Hydrogen Production, Iron and Steel Manufacturing, Lime Manufacturing, Oil and Natural Gas Systems, Petroleum Refineries, Pulp and Paper Production, Stationary Combustion, and Electricity Generators.

c. Implement Process Changes

Process changes reduce GHG emissions by altering the manner in which tasks are accomplished. For example, HNO_3 manufacturing facilities can be designed to promote chemical reactions that release less GHG, or refineries could capture excess gases, such as CH_4, rather than combusting them through flaring. Examples of possible process changes are described below. There are likely many other process changes that are unique to specific industries or individual businesses.

Increase Use of Pozzolans

Pozzolans are materials that have cementitious properties when combined with calcium hydroxide. Pozzolans can be substituted for cement in the production of concrete. Increasing the amount of pozzolans and reducing the amount of cement in concrete could reduce the volume of GHG emissions per unit of concrete produced. Common pozzolans include fly ash, slag, and geologic materials primarily of volcanic origin.

Cement Manufacturing is the only covered entity that could benefit from this compliance response. Cement manufacture is a demand-driven industry that provides product consistent with customer orders up to the capacity of production equipment. It is not anticipated that cement manufacturers would reduce cement production below existing

levels as a means to comply with the cap-and-trade regulation. But it is foreseeable that this response could allow increased production of concrete to meet future needs without increasing GHG emissions from cement plants.

Electric Arc Furnace Improved Foaming Process

Information from the ARB mandatory reporting database indicates that there is one EAF in California that produced sufficient emissions to warrant reporting. There may be additional facilities which operate below reporting levels. EAF furnaces use electricity and fossil fuels to melt steel. GHG emissions can be reduced by the installation of modern foaming control devices that reduce process emissions from the melting of iron, steel, and alloys.

The benefits of this technology would be limited to Iron and Steel Manufacturing facilities that melt steel and related metals using an EAF.

Oil and Gas Maintenance and Operating Procedures

Oil and gas wells, drilling sites, and associated field facilities use emission control devices such as low-emission regulator valves, leak detection and measurement equipment, venting and flaring equipment, emissions reduction systems, ICE and turbines. Implementation of improved maintenance and operating procedures may reduce GHG emissions. In addition to upgrading or replacing aged equipment (as described in the Upgrade Equipment compliance response), systematic monitoring, maintenance, and modification of operating procedures to reduce unnecessary operations, ensure that equipment and control devices are in proper operating condition, and altering practices such as flaring to minimize consequent emissions can reduce GHG emissions from these covered entities.

The Oil and Natural Gas Systems covered entity is expected to implement this compliance response.

Increase Use of Recycled Materials

Glass and steel offer the unique benefit of being highly recyclable (i.e., essentially all of the returned product can be cost-effectively melted, mixed with new material, and formed into a new product) using less energy than that required for traditional processing of raw materials.

The Glass Manufacturing and Iron & Steel Production covered entities are expected to implement this compliance response.

Conservation

Conservation is reducing emissions by using less fuel by altering operations to reduce or eliminate fuel use. Conservation could be achieved by reducing boiler temperatures or unnecessary operation of equipment during periods when full operating conditions are not necessary such as over-night, long weekends or extended holidays. Operators may reduce or eliminate practices that are convenient but unnecessary, such as idling

engines for long periods or maintaining operating temperatures in boilers when they are not in use.

None of the covered entities are expected to implement conservation as a primary compliance response, but as the price of carbon (compliance) increases most entities are expected to more carefully monitor fuel combustion, reducing or reducing excess or unnecessary activities.

d. Surrender Compliance Instruments

Each covered entity subject to the cap-and-trade regulation would have the flexibility to determine the most appropriate manner of compliance. The decision to reduce emissions or surrender allowances and/or offset credits in lieu of making reductions would be affected by the cost of emission reductions compared to the availability and price of allowances and offset credits (compliance instruments). In a cap-and-trade program, a limit, or *cap* is put on the amount of pollutants (GHGs) that can be emitted.

The cap is implemented by creating allowances – each allowance being a limited authorization to emit one $MTCO_2e$ -- equal to the cap set for cumulative emissions from all the covered sectors. These allowances may be auctioned, distributed for free, or some combination thereof. Sources in the capped sectors must report their emissions and must surrender allowances to match those emissions in accordance with the schedule in the regulation. Sources in capped sectors can meet a portion of their surrender obligation by surrendering offset credits in place of allowances. Each offset credit represents one MT of emissions reduction or removal from sources that are not in capped sectors. The use of offset credits would allow emissions in the capped sectors as a whole to slightly exceed the total number of allowances issued. As used in this document, the term *compliance instrument* includes both allowances and offset credits.

2. Aesthetics

This section evaluates potential impacts that could result from implementation of the covered entity compliance responses. The reasonably foreseeable covered entity compliance responses are (1) Upgrade Equipment, (2) Decarbonization, (3) Implement Process Changes, and (4) Surrender Compliance Instruments.

a. Impact Analysis

Implementation of the covered entity compliance responses is expected to pose less than significant impacts to aesthetic resources.

Upgrade Equipment

This compliance response entails upgrading, retrofitting, and/or replacement of aging equipment at existing facilities. Equipment improvements would consist of modifications to existing equipment and/or installation of new equipment at existing facilities. It is possible that incidental new structures, such as ancillary outbuildings, covered shelters, or onsite utility lines might be necessary to accommodate some improvements.

Improvements at existing facilities would not substantially alter the visual environment and would result in less than significant impacts.

Decarbonization

This compliance response entails switching to less carbon intensive fuels. Any equipment modifications required to accommodate new fuels would be accomplished at existing facilities. Tanks or other fuel storage structures would be located onsite within an existing industrial environment. None of these changes are expected to significantly alter the aesthetic environment of the industrial site or surrounding vicinity. As such, fuel switching would pose less than significant *adverse* impacts.

Implement Process Changes

This compliance response entails altering monitoring, maintenance, and repair procedures or processes at existing industrial facilities, or altering the manner in which an industrial process is accomplished, to reduce GHG emissions. None of these activities would be expected to significantly alter the aesthetic characteristics of the industrial setting or surrounding vicinity. As such, this compliance response would pose less than significant impacts.

Surrender Compliance Instruments

This compliance response represents the obligation of each covered entity to surrender compliance instruments, i.e. allowances or offset credits equal to their GHG emissions. The transaction of allowances or offset credits would pose *No Impact* to environmental resources. Design of the cap-and-trade program with and without offsets is evaluated in the Alternatives Analysis section, and the potential environmental effects that could result from offset projects are described in the respective protocol impact analysis sections of this FED.

b. Mitigation

Recognized Measures

There are recognized measures that are widely accepted to minimize aesthetic impacts and/or improve the visual character of industrial, business and/or commercial facilities. It is likely that some covered entities would implement measures to maintain or improve the visual quality of their businesses either as a result of local ordinances, permit conditions, or simply good business practices. Examples of recognized effective measures include:

- To the extent possible, install new equipment and improvements within existing structures.
- Where new structures or enclosures are necessary, avoid sky lining of structures or electrical lines.

- Install privacy fencing and/or vegetative screening.
- Locate and design facilities, structures, and roads to blend with the existing visual environment, vegetation, and facilities.

Mitigation

Mitigation is not warranted.

3. Agriculture and Forest Resources

This section evaluates potential impacts that could result from implementation of the covered entity compliance responses. The reasonably foreseeable covered entity compliance responses are (1) Upgrade Equipment, (2) Decarbonization, (3) Implement Process Changes, and (4) Surrender Compliance Instruments.

a. Impact Analysis

As described below, the compliance responses would occur at existing industrial facilities and would not significantly contribute to the conversion of prime farmland, unique farmland or farmland of statewide importance, conflict with existing agricultural zoning or a Williamson Act contract, or directly affect forest resources. Therefore potential impacts to agriculture and forest resources are considered less than significant.

Upgrade Equipment

This compliance response entails upgrading, retrofitting, and/or replacement of aging equipment at existing facilities. Equipment improvements would consist of modifications to existing equipment and/or installation of new equipment at existing facilities. It is possible that incidental new structures, such as ancillary outbuildings, covered shelters, or onsite utility lines might be necessary to accommodate some improvements. Improvements at existing facilities would not substantially alter agriculture or forest resources. This would be a less than significant impact.

Decarbonization

This compliance response entails switching to less carbon intensive fuels. Any equipment modifications required to accommodate new fuels would be accomplished at existing facilities. Tanks or other fuel storage structures would be located onsite within an existing industrial environment. None of these changes would be expected to significantly alter agriculture or forest resources. This would be a less than significant impact.

Implement Process Changes

This compliance response entails altering monitoring, maintenance, and repair procedures or processes at existing industrial facilities, or altering the manner in which an industrial process is accomplished, to reduce GHG emissions. None of these activities would be expected to significantly impact agriculture or forest resources. This would be a less than significant impact.

Surrender Compliance Instruments

This compliance response represents the obligation of each covered entity to surrender compliance instruments, i.e. allowances or offset credits equal to their GHG emissions. The transaction of allowances or offset credits would have no impact on environmental resources. Design of the cap-and-trade program with and without offsets is evaluated in the Alternatives Analysis section, and the potential environmental effects that could result from offset projects are described in the respective protocol impact analysis sections of this FED.

b. Mitigation

Implementation of the covered entity compliance responses poses less than significant impacts to agriculture and forest resources, and as such mitigation is not warranted.

4. Air Quality

This section evaluates potential air quality impacts that could result from implementation of the proposed cap-and-trade program, specifically emission of reactive organic gases (ROG), carbon mo NO_xide (CO), nitrogen oxides (NO_x), particulate matter – 2.5 microns ($PM_{2.5}$), and diesel PM as a toxic air contaminant (TAC). GHG emissions are discussed in the greenhouse gas chapter of this FED.

This section also includes a summary of local community impacts analyzed in the Emissions Assessment included as Appendix P to the Staff Report.

a. Impact Analysis

The following analysis looks at a range of potential compliance options for industrial and electricity generation sources in the cap-and-trade program. Most compliance approaches are expected to result in reductions in co-pollutants through increased efficiency and decreased combustion of fossil fuels. However, the regulation affords entities flexibility to choose the most cost-effective strategies to reduce emissions, so the potential for some compliance actions to result in increased co-pollutant emissions at some facilities cannot be entirely discounted.[4] For this reason, as described below in the mitigation section, continued monitoring and review will be necessary to identify situations where increases in criteria pollutants and toxics might occur, and to allow the appropriate agencies to take the needed steps to address them. Many of the mechanisms are already in place to do so: stationary source control and permitting

[4] Not all emissions increases at facilities covered by the cap-and-trade program will result from the program itself. The cap-and-trade program will place a new regulatory requirement and a new cost on GHG emissions from all covered facilities, so that the program provides an incentive to decrease (or to minimize increases in) GHG emissions and any related emissions of criteria or toxic emissions. While the program provides flexibility that could allow increased production due to economic growth, such increases would not be caused by the cap-and-trade program. Staff believes that only in very limited circumstances would a localized emissions increase be the actual result of the incentives created by the cap-and-trade program – e.g. shifting of production within a company from an inefficient facility with higher compliance costs to a more efficient facility that results in higher emissions at the more efficient facility.

programs, toxics control and risk assessment requirements, and air monitoring for ozone, PM2.5, and toxics.

Although ARB believes that the potential for emission increases attributable to the proposed rule is very unlikely, ARB is committed to monitoring the implementation of the cap-and-trade regulation to identify and to address any situations where the program has caused an increase in criteria pollutant or toxic emissions. At least once each compliance period, ARB will use information collected through the mandatory reporting regulation, the cap-and-trade regulation, the industrial efficiency audit, and other sources of information to evaluate how individual facilities are complying with the regulation. The cap-and-trade program is another layer of review and opportunity for data gathering, decision-making, and agency and public vigilance to ensure any potential increases are identified and addressed.

Statewide Emission Inventories and Impacts

The existing condition (baseline) for criteria pollutants obtained from the ARB criteria emissions inventory is presented in Table 4B-1. The existing condition (2010) includes only ARB rules and SIP measures adopted by July 2010. Conditions in 2020 are estimated by projecting growth of the 2010 existing condition emissions assuming no additional regulatory controls except the adopted SB 375 Regional Targets and RES Scoping Plan Measures. Other adopted Scoping Plan measures are expected to provide only incidental reduction of criteria pollutants, and as such are not included in Table 4B-1 and reductions are not attributed to those measures.

Combustion of fossil fuels is the source of most GHG emissions from the industrial facilities that would be subject to the cap-and-trade regulation. Combustion also emits criteria and TAC pollutants. Consequently, covered entity compliance responses that reduce combustion emissions may be assumed to achieve a proportionate reduction of criteria pollutant and TAC emissions, estimated as follows. The existing conditions projected to 2020 are estimated to be 507 $MMTCO_2e$, of which 409 $MMTCO_2e$ are from capped sectors. Reductions needed to meet the cap of 334 $MMTCO_2e$ will come in part through complementary measures from the Scoping Plan. After reductions from those measures, the cap-and-trade regulation is estimated to reduce at least 18 $MMTCO_2e$, representing a 4 percent reduction from capped sector emissions.

The existing condition includes emissions that are not produced by combustion, such as fugitive emissions. As shown in Table 4B-1, non-combustion emissions were subtracted from the net emissions. The estimated 4 percent reduction of pollutants was calculated based on only emissions from combustion sources, and are approximately 26 tons per day (TPD) of ROG, 221 TPD of CO, 55 TPD of NO_x, and 4 TPD of $PM_{2.5}$.

Table 4B-1
Statewide Emissions (Existing Condition)
Existing ARB Rules and Scoping Plan Measures
(Tons per day)

Economic Sector	ROG		CO		NO_x		$PM_{2.5}$	
	2010	**2020**	**2010**	**2020**	**2010**	**2020**	**2010**	**2020**
Transportation	831.6	650.9	7,123.0	5,496.7	1,638.9	1,122.7	140.9	142.3
Electric Power	4.3	4.5	46.3	55.3	36.7	41.7	6.5	7.4
Commercial and Residential	62.2	66.7	814.8	865.6	108.9	115.8	133.6	144.7
Industrial	703.2	779.2	191.5	229.3	220.0	253.2	78.9	101.3
Recycling and Waste	40.4	47.6	1.5	2.0	1.0	1.4	0.5	0.6
Agriculture	181.2	196.9	302.1	282.9	107.9	55.9	135.9	151.0
Forestry	177.8	177.6	3,478.7	3,477.4	93.5	93.4	294.5	294.2
Total Gross Emissions	2,000.6	1,923.3	11,957.8	10,409.2	2,206.9	1,684.0	790.7	841.5
Forestry Net Emissions	*2,067.3*	*2,067.3*						
Net Emissions	**4,067.9**	3,990.6	**11,957.8**	10,409.2	**2,206.9**	1,684.0	**790.7**	841.5
RES Reductions*		1.0		4.1		6.6		1.4
SB 375 Regional Targets Reductions*		4.1		36.75		3.39		0.38
Cap-and-Trade Reductions		26.1		220.9		55.4		3.5
TOTAL NET EMISSIONS		**3959.4**		**10147.4**		**1618.6**		**836.2**
CALCULATION OF CAP-AND-TRADE REDUCTIONS								
Combustion Emissions from Sources Subject to Cap-and-Trade*		**651.7**		**5,523.5**		**1,385.6**		**88.7**
Cap-and-Trade Reductions (4% of combustion emissions)		26.1		220.9		55.4		3.5

* SB 375 Regional targets and RES are Scoping Plan measures expected to provide substantial co-benefits. Air quality co-benefits from other Scoping Plan measures are not assumed.

Table 4B-2 presents estimated statewide criteria emissions in 2020 based on projections that include the implementation of ARB rules and SIP measures that are expected to be in place by 2020. Because the implementation of new regulations is expected to reduce statewide emissions, the estimated reductions that would be achieved by cap-and-trade (calculated as 4 percent of statewide combustion emissions) are slightly reduced under this scenario. As shown in Table 4B-2, the predicted reductions of the respective criteria pollutants under this scenario are approximately 22 TPD of ROG, 210 TPD of CO, 51 TPD of NO_x, and 3 TPD of $PM_{2.5}$.

Table 4B-2
Statewide Emissions
All ARB Rules and Foreseeable Scoping Plan Measures
(Tons per day)

Economic Sector	ROG		CO		NO_x		$PM_{2.5}$	
	2010	**2020**	**2010**	**2020**	**2010**	**2020**	**2010**	**2020**
Transportation	831.6	560.6	7,123.0	5,236.2	1,638.9	1,011.4	140.9	139.3
Electric Power	4.3	4.0	46.3	53.3	36.7	38.4	6.5	6.7
Commercial and Residential	62.2	66.7	814.8	865.6	108.9	115.8	133.6	144.7
Industrial	703.2	779.2	191.5	229.3	220.0	253.2	78.9	101.3
Recycling and Waste	40.4	47.6	1.5	2.0	1.0	1.4	0.5	0.6
Agriculture	181.2	196.9	302.1	282.9	107.9	55.9	135.9	151.0
Forestry	177.8	177.6	3,478.7	3,477.4	93.5	93.4	294.5	294.2
Total Gross Emissions	2,000.6	1,832.6	11,957.8	10,146.7	2,206.9	1,569.5	790.7	837.7
Forestry Net Emissions	*2,067.3*	*2,067.3*						
Net Emissions	**4,067.9**	3,899.8	**11,957.8**	10,146.7	**2,206.9**	1,569.5	**790.7**	837.7
RES Reductions*		1.47		6.09		9.85		2.12
SB 375 Regional Targets Reductions*		4.1		36.75		3.39		0.38
Cap-and-Trade Reductions		22.4		210.4		50.8		3.4
Total Net Emissions		**3871.9**		**9893.4**		**1505.4**		**831.8**
CALCULATION OF CAP-AND-TRADE REDUCTIONS								
Combustion Emissions from sources subject to Cap-and-Trade*		561.0		5,261.0		1,271.1		85.1
Cap-and-Trade Reductions (4% of combustion emissions)		22.4		210.4		50.8		3.4

* SB 375 Regional Targets and RES are Scoping Plan measures expected to provide substantial co-benefits. Air quality co-benefits from other Scoping Plan measures are not assumed.

Diesel Particulate Matter (DPM) is a TAC that originates from the combustion of diesel fuels. Based on the same methodology ascribed to the estimated reduction of criteria pollutants presented above, cap-and-trade compliance responses are also assumed to reduce DPM emissions by 4 percent. DPM data from ARB inventories is presented in Table 4B-3 for both the existing condition and the condition that includes implementation of new regulations. Existing statewide DPM emissions are approximately 51 TPD, but the implementation of already adopted regulations, primarily in the transportation sector, is predicted to reduce that level to an estimated 19 TPD by 2020. The reduction of DPM attributed to cap-and-trade is assumed to be 4 percent of

2020 statewide emissions, resulting in 0.78 TPD under the existing condition projection for 2020 and 0.74 TPD under conditions with envisioned new regulations.

Table 4B-3
Statewide Diesel Particulate Matter Emissions

Diesel PM Emissions in Scoping Plan Format	Existing Conditions Existing Rules and Measures Adopted thru July 2010 (Tons per day)		Future Conditions All Rules and Foreseeable Measures in 2020 (Tons per day)
	2010	2020	2020
Transportation	44.54	16.37	15.40
Electric Power	0.10	0.11	0.11
Commercial and Residential	0.14	0.16	0.16
Industrial	0.93	0.95	0.95
Agriculture	5.17	1.90	1.90
Total Gross Emissions	50.88	19.49	18.53
Forestry Net Emissions			
Subtotal Net Emissions	50.88	19.49	18.53
Cap-and-Trade (4%)	2.04	0.78	0.74
Total Net Emissions	**48.84**	**18.71**	**17.79**

b. Compliance Responses

The reasonably foreseeable covered entity compliance responses are (1) Upgrade Equipment, (2) Decarbonization, (3) Implement Process Changes, and (4) Surrender Compliance Instruments.

The Emissions Assessment (Appendix P) includes a detailed discussion of potential emission impacts resulting from the proposed cap-and-trade program. The compliance pathways analysis (Appendix N) also provides information about the types of actions covered entities may pursue.

Upgrade Equipment

This compliance response entails upgrading, retrofitting, and/or replacement of aging equipment at existing facilities. Equipment improvements would consist of modifications to existing equipment and/or installation of new equipment. Emission reductions realized from this compliance response would be attributed to increased fuel efficiency of new systems, retrofitting of traditional equipment as well as improved heat capture and containment in kilns, furnaces, or other enclosures. Implementation of these actions would reduce GHG emissions and in most cases criteria pollutant emissions as well.

This combined with the broader emission reductions required from ongoing control programs is expected to result in a net decrease in emissions, which would be considered a beneficial effect.

Upgrading equipment could also include the construction of incidental buildings and structures that could be necessary to enclose new equipment. This construction could entail site grading and trenching. In most cases the disturbed area would be minimal, consistent with building foundations and underground utilities. Operation of construction equipment would emit GHG and criteria pollutants. Grading and trenching have the potential to generate dust (PM). Project-level compliance with construction permits issued at the local level, which routinely require mitigation to avoid these short-term construction-related impacts would minimize these impacts to a level of less than significant. However, the authority to require site- or project-specific mitigation is within the purview of jurisdictions with local permitting authority, such as city or county governments and local air districts. ARB does not have the authority to require project-level mitigation, and therefore this analysis conservatively considers this impact potentially significant to air quality. Project-specific impacts and mitigation would be identified during the environmental review by agencies with regulatory authority.

Decarbonization

This compliance response entails switching to less carbon intensive fuels. Switching to a less carbon intensive fuel would reduce GHG emissions and could reduce criteria pollutants and TACs as well. This would be a beneficial effect.

Any equipment modifications required to accommodate new fuels would be accomplished at existing facilities. Construction impacts that might be necessary to accommodate new fuel tanks, storage structures, or lines are the same as those described under the preceding 'Upgrade Equipment' compliance response, and identified as a potentially significant impact.

Combustion of used tires instead of coal is one example of switching to a less carbon-intensive fuel. The portion of the emissions from the combustion of the natural rubber content is credited as biomass. The incomplete combustion of tires can produce emissions containing dioxins, furans, and metals. One cement manufacturing facility in California has been permitted to combust a fuel mixture that allows up to 70 percent tires, and a couple smaller cement facilities augment their fuel mixtures with lesser percentages of tires. Combustion of used tires as fuel is controversial and can be relatively expensive to implement. The compliance pathways analysis indicates that the implementation of alternative fuels at cement plants is relatively expensive, on the order of $40 per ton of GHG reduction. Consequently, this action is not considered a reasonably foreseeable compliance response for the vast majority of covered entities.

Implement Process Changes

This compliance response entails altering monitoring, maintenance, and repair procedures or processes at existing industrial facilities, or altering the manner in which an industrial process is accomplished, to reduce GHG emissions. This compliance

response would be expected to improve equipment performance, reduce leaks or inadvertent releases, and/or alter existing processes such as flaring to reduce emissions. These activities would be expected to reduce criteria pollutant emissions as a result of increased efficiency and reduce fuel combustion, and represents a potentially beneficial effect.

Although ARB staff does not anticipate that the cap-and-trade program would result in emissions increases, the Co-Pollutant Emissions Assessment (included as Appendix P to the Staff Report) examined some hypothetical possibilities for potential increases in criteria pollutant emissions from certain facility types in four community specific case studies. This analysis is presented in greater detail under Local Community Impacts and Community Assessments below. Staff generally believes that the combination of placing a price on carbon and setting a declining cap on emissions should incentivize investment in more efficient processes and equipment, reducing criteria pollutant emissions. Although considered unlikely, it is also possible that an unknown number of covered entities could shift operations between facilities or equipment as part of their compliance response, reducing operation of less efficient equipment while increasing operation of more efficient equipment to achieve reductions. Due to abundance of caution, staff analyzed two scenarios, which are considered unlikely to occur as a result of the proposed cap-and-trade program, that assume increased production at existing facilities in the community and the siting of a hypothetical new facility in the community. The assessment does not include criteria pollutant and toxic emission reductions that the cap-and-trade program is expected to provide from transportation fuels and commercial and residential gas use in addition to those likely to occur at industrial facilities. The analysis found that California's existing programs to meet federal air quality standards will provide the majority of emission reductions in each community, ranging from 15-45 percent reduction of NO_x by 2020. The proposed cap-and-trade regulation is expected to have a beneficial effect on emissions with the potential to provide small additional NO_x reductions in the range of 1- 3 percent if all measures were implemented locally. However, the specific impacts in specific locations cannot be determined. In light of this uncertainty, this analysis takes a conservative approach and considers this to be a potentially significant impact.

Surrender Compliance Instruments

This compliance response represents the obligation of each covered entity to surrender compliance instruments, i.e. allowances or offset credits equal to their GHG emissions. The actual transaction of allowances or offset credits would not result in adverse air quality impacts. Design of the cap-and-trade program with and without offsets is evaluated in the Alternatives Analysis section, and the potential environmental effects that could result from offset projects are described in the respective protocol impact analysis sections of this FED. To the extent that a price on GHG emissions causes a shift in production or operations among facilities, equipment or processes within California, those impacts are addressed under the "Implement Process Changes" compliance response above.

c. Community Case Studies

For major pollutants like ozone and $PM_{2.5}$, it is important to ensure that any actions taken through a cap-and-trade rule do not hinder progress toward attainment of air quality standards established to protect public health. With that as a framework, this section focuses on four communities and explores hypothetical situations that might result from the implementation of a cap-and-trade rule at a local level. A full description of the assessment appears in Appendix P: Co-Pollutant Emissions Assessment.

The choice of communities captures the diverse nature of California's air quality problems, as well as range of sources that would be subject to the cap-and-trade regulation. The boundary of each assessment area captures the most highly impacted communities. Because community level exposure reflects impacts from both local and regional emission sources, the size of each assessment area was selected to encompass a representative sampling of cap-and-trade sources which could potentially impact the local community. The size also represents a balance between reflecting broader regional-scale impacts versus smaller facility-specific impacts. The four communities are:

- Wilmington and Richmond: These two cities are part of larger metropolitan areas in Southern and Northern California. They are located among a nexus of major transportation corridors, large refineries and other industrial and electricity generation facilities, and busy international ports. The concentration of emission sources contribute to air quality problems in the local community, as well as downwind areas. Both Wilmington and Richmond have a large number of industrial and electricity generation facilities that would be subject to the cap-and-trade regulation.

- Bakersfield/Oildale: This region of the Central Valley has a mix of sources ranging from agricultural operations to widely dispersed stationary sources. The area also has a significant amount of mobile source emissions, resulting from its location along the two interstate highways connecting Northern and Southern California. The Bakersfield region has one of the most severe air quality problems in the nation. The Bakersfield/Oildale area contains a diverse array of industrial and electricity generation facilities that would be subject to the cap-and-trade regulation.

- Oro Grande: This community is located in the high Mojave Desert and includes the moderately sized towns of Hesperia and Victorville. Local air pollution sources are primarily from mineral extraction and related commercial activities. This area has a small number of industrial and electrical generation sources that would be subject to the cap-and-trade regulation, with a focus on cement manufacturing. The local air quality problem is primarily due to the community's proximity to the South Coast, which transports substantial air pollution into the Mojave Desert.

As noted above, each community has a unique mix of industrial and electricity generation sources that would be subject to the cap-and-trade regulation. Air quality experienced by community residents is influenced by regional emissions and air quality levels, as well as an additional overlay from local sources. Therefore the assessment for each community begins with an overview of air quality and emissions on a regional basis, and then focuses on the nature of the local air quality problem and the local sources, including industrial and electricity generation facilities expected to be subject to the cap-and-trade regulation. It is difficult to predict how individual facilities within a given community may respond to the cap-and-trade regulation. However, staff examined hypothetical bounding scenarios in each community based on the nature of the sources in that community and the possible responses for each cap-and-trade sector, as discussed in Appendix P: Co-Pollutant Emissions Assessment.

Description of the Scenarios

Because of the compliance flexibility provided by the cap-and-trade regulation, it was not possible to identify facility-specific changes that might occur within each community. Instead, three basic hypothetical bounding scenarios were used to assess potential cumulative emissions impacts. Those bounding scenarios are: (1) a bounding co-benefit scenario, where all covered industrial and electricity generation facilities within the community reduce their greenhouse gas emissions, (2) a bounding dis-benefit scenario where all covered facilities increase their emissions, and (3) a second dis-benefit scenario where a new facility is built in the community.

For each assessment, the emissions reductions that will result from ongoing regulatory programs to reduce co-pollutants between 2008 and 2020 provide the baseline for evaluating each scenario's impacts. This baseline reflects what would occur in the absence of cap-and-trade, or if all GHG reductions were achieved outside the community.

The first scenario explores the potential co-benefits of limiting trading and the use of offsets within a community. The baseline (no change) and the first scenario bound the most likely impact of the regulation's implementation. In addition, staff examined the potential impacts of general facility growth through two additional scenarios. The possible co-pollutant increases in these two additional scenarios cannot be specifically attributed to the cap-and-trade regulation. The scenario analysis focused on the industrial and electricity generation facilities covered under cap-and-trade and does not address the additional reductions that will likely occur when transportation fuels and commercial and residential natural gas are also included under the cap.

ARB staff believes that scenarios 2 and 3 are very unlikely to result from the cap-and-trade regulation. Many factors influence a decision to expand production or build a new facility, and the cap-and-trade program itself imposes a new requirement on facilities—the need to procure allowances and offsets to accommodate GHG emissions—in addition to the strict permitting requirements already in effect for criteria pollutants and toxic air contaminants. Under scenario 2, every facility would need to purchase allowances and offsets to accommodate any growth. We believe it is more likely that a

few facilities may increase production, while others would decrease. Similarly, we do not believe that compliance with the cap-and-trade regulation will cause the siting of new facilities assumed in scenario 3, though the regulation would not prevent it. Nevertheless, both scenarios are useful as hypothetical bounding analyses.

Scenario 1: The first scenario assumes as a hypothetical upper bound that GHG emissions reductions occur at each of the local industrial and electricity generation facilities in the community. On average, the cap-and-trade industrial and electricity generation sources will need to reduce their GHG emissions by 4 percent to meet the 2020 cap.[5] Therefore, staff assumed a commensurate 4 percent reduction would occur in combustion-related NO_x, $PM_{2.5}$, and reactive organic gases (ROG) from these industrial and electricity generation facilities. These additional reductions would further enhance the cumulative emissions reductions from ongoing programs.

Scenario 2: The second scenario represents a hypothetical emissions increase of 4 percent at each of the cap-and-trade facilities in the community. While this scenario provides a hypothetical upper bound of aggregate facility growth in the community, staff believes it is an unlikely situation, given the current regulatory structure. As described in Appendix P: Co-Pollutant Emissions Assessment, each individual unit of permitted equipment has a maximum permitted emission limit. Large facilities such as those covered under cap-and-trade often have hundreds of individual permits. If the facility owner modified that equipment or its operation such that actual emissions would exceed the permitted levels, New Source Review (NSR) and its requirements to implement Best Available Control Technology (BACT) would apply. This is a comprehensive and lengthy process that is subject to public review. The extensive requirements of this permitting process effectively limit the potential for significant emissions increases at a given facility.

In addition, under this scenario, every facility would need to purchase allowances and offsets to accommodate any growth. While there could be growth at a few facilities within a community, as some facilities move to more efficient ways of operation or switch to use of less carbon-intensive fuels, it is very unlikely that emissions would increase at every facility. Much more likely is a situation where a few facilities may increase production, while others would decrease. Nevertheless, staff evaluated the impact of an increase of 4 percent at every facility to represent a potential maximum community-level impact.

Scenario 3: For the third scenario, ARB assumed the hypothetical construction of a new facility within the community. For each community, ARB chose to site a facility consistent with the already existing industrial and electricity generation sources. Siting

[5] Total GHG emissions under existing conditions projected to 2020 are estimated to be 507 $MMTCO_2e$, of which 409 $MMTCO_2e$ are from capped sectors. Reductions needed to meet the cap of 334 $MMTCO_2e$ will come in part through complementary measures from the Scoping Plan. After reductions from those measures, the cap-and-trade regulation is estimated to reduce at least 18 $MMTCO_2e$, representing a 4 percent reduction from capped sector emissions.

of a new facility would generally trigger NSR and its requirements to implement BACT would apply. This is a comprehensive and lengthy process that is subject to public review. In addition, the new facility would need to purchase allowances and offsets to accommodate its GHG emissions. As discussed above, ARB staff believes that the cap-and-trade regulation is unlikely to trigger construction of new facilities.

There is also the potential for increases in toxic air contaminants under Scenarios 2 and 3. Toxics emissions are typically reflected in $PM_{2.5}$ and ROG emission estimates, thus efforts to control ROG and $PM_{2.5}$ also help address toxic air contaminants broadly within the community. In addition, the requirements of the "Hot Spots"[6] Information and Assessment Act are designed to assess and mitigate more localized, facility-specific impacts. As described earlier in this section, should emissions of toxics increase such that they exceed the screening threshold, the facility would be required to conduct a Health Risk Assessment. Facility emissions that are determined to present a significant risk would then be required to implement measures to reduce that risk.

Limitations

These scenarios focus on the compliance responses of the industrial and electricity generation sources covered by the cap-and-trade regulation. In 2015, transportation fuels and commercial and residential natural gas will be included in the cap, likely reducing emissions from those sources. Because the reductions associated with transportation fuel and commercial and residential natural gas would be the same for each of the scenarios, ARB chose to focus the analysis on industrial and electricity generation sources. The inclusion of the emissions reductions from transportation fuel and commercial and residential natural gas would likely increase the total co-pollutant benefits of the cap-and-trade regulation.

In all scenarios it is difficult to predict the actual air quality impacts within the local community of any change in emissions. For example, combustion emissions, especially from large industry and electricity generation sources, are often vented through tall stacks. The heat generated by the combustion process can further increase the height of the emissions plume. As a result, emissions from a large stack may not reach the surface until some distance downwind. In addition, due to dispersion and the time needed for chemical reactions to form regional pollutants such as ozone and secondary particulate matter, the maximum air quality impact may occur well downwind of a facility.

Air quality modeling is a standard tool for relating emissions to estimated air quality impacts. However, detailed information is required by the models to quantify the impacts. This information includes specificity on locations and types of emission sources, stack heights, timing of emissions, emission rates, and for point sources, information to characterize the point of release. Due to the flexibility each individual facility has to comply with the cap-and-trade regulation, it is impossible to characterize

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[6] California Air Resources Board: Webpage (as reviewed January 14, 2010): AB 2588 Air Toxics "Hot Spots" Program. http://www.arb.ca.gov/ab2588/ ab2588.htm.

the timing and location of emissions changes. This makes use of modeling to characterize the air quality impact of potential changes in emissions infeasible.

Health assessments of the impact of air quality changes on human health require estimates of the change in $PM_{2.5}$, ozone, and other air pollutants for an exposed population. The health impact depends on the air pollutant type and ambient concentration, location and duration of exposure, and characteristics of the exposed population, including total number of residents, age, and baseline incident rates for various death and disease types where a quantitative relationship has been established with an air pollutant. Health assessments in California have been limited to pollution sources where $PM_{2.5}$, ozone, and air toxic exposures can be estimated using measured air quality data as a surrogate for a widely distributed source (e.g., trucks) or with the use of air quality models (e.g., ports and rail yards). However, there is no unique air quality surrogate for the large industrial and electricity generation sources covered by the cap-and-trade regulation to distinguish them from smaller industrial and electricity generation sources or other types of combustion sources. Nor, as discussed above, was it feasible to conduct air quality modeling. Due to this lack of information on the concentration, location, and duration of air pollutant exposures, it was not possible to conduct a health assessment.

Wilmington Assessment

Wilmington is a suburb of Los Angeles, with a racially and ethnically diverse population of about 53,000 (See map in Appendix P: Co-Pollutant Emissions Assessment). Located between the Port of Los Angeles and the Port of Long Beach, the Wilmington area includes a diverse range of stationary and mobile source emissions. In combination, these two ports represent the third largest container port in the world and account for about 25 percent of California's goods movement emissions[7]. These shipping activities result in large amounts of diesel and fugitive emissions from bulk transport operations. In addition to port-related activities, Wilmington and the surrounding area are home to rail yards, major transportation corridors, oil refineries, and power plants, as well as other industrial and commercial operations. Approximately 300,000 people live within the emissions assessment area.

A total of 15 industrial and electricity generation facilities in the Wilmington area would be subject to the cap-and-trade regulation. See Appendix P: Co-Pollutant Emissions Assessment for a description of air quality and emissions in the Wilmington area and the traditional emissions control programs currently in place. Appendix P: Co-Pollutant Emissions Assessment also includes a discussion of potential emissions changes that could occur under the cap-and-trade regulation.

As described above, ARB developed three hypothetical bounding scenarios to assess potential cumulative emissions impacts in 2020 in Wilmington. For the third scenario

[7] California Air Resources Board (2006): Proposed Emission Reduction Plan for Ports and Goods Movement in California. http://www.arb.ca.gov/planning/gmerp/march21plan/march22_plan.pdf

(placing a new facility in the community), ARB evaluated the hypothetical construction of a new combined heat and power facility within the community. A combined heat and power generation facility was selected because petroleum refining is the largest cap-and-trade emissions sector in the Wilmington area. This would have the dual benefit of providing a more efficient heat source for refinery processes, while allowing excess power to be sold back to the grid. Table 4B-3 provides an estimate of criteria pollutant emissions from a hypothetical 85 megawatt (MW) combined heat and power unit. It is important to remember that under California's existing regulatory structure, the construction of a new facility would be subject to the strict NSR permitting requirements described in Appendix P: Co-Pollutant Emissions Assessment. This would include requirements to implement BACT, as well as to offset the emissions regionally.

Table 4B-3
Estimated Criteria Pollutant Emissions
Hypothetical Combined Heat and Power Facility
(85 MW Capacity)

	Emissions (tons per day)		
	NO_x	**ROG**	**PM2.5**
Operating Emissions	0.11	0.05	0.12

Analysis of Potential Impacts

Under existing conditions, including rules adopted in the 2007 State Implementation Plan (SIP)[8] to meet national air quality standards, the Wilmington area will realize further NO_x, $PM_{2.5}$, and ROG emissions reductions in 2020. The reductions will come primarily from mobile sources, including light- and heavy-duty vehicles and from port-related activities such as ships maneuvering and anchoring within the port area and equipment used to load and unload ships. As shown in Table 4B-5, these ongoing emissions reductions result in a 23 percent reduction in NO_x, a 24 percent reduction in $PM_{2.5}$, and a 4 percent reduction in ROG emissions from 2008 levels.

The first scenario assumes that all the emission reductions needed from the cap-and-trade regulation are implemented locally at the 15 industrial and electricity generation facilities in the Wilmington area, realizing a further 4 percent reduction in combustion-related co-pollutant emissions. Because emissions from the cap-and-trade industrial and electricity generation facilities comprise only a small portion of the overall inventory,

[8] California Air Resources Board: Webpage (as reviewed February 9, 2010): Proposed State Strategy for California's State Implementation Plan (SIP) for the New Federal PM2.5 and 8-Hour Ozone Standards. http://www.arb.ca.gov/ planning/sip/2007sip/2007sip.htm

these reductions translate into less than a 4 percent decrease in the total inventory for the Wilmington area. In aggregate, implementation of reductions for the cap-and-trade regulation by industrial and electricity generation sources locally would result in an additional 1 percent enhancement in localized NO_x and $PM_{2.5}$ reductions, and a small enhancement of less than 1 percent in ROG reductions. While not quantified here, combustion-generated toxic air contaminants would also likely decrease.

Table 4B-5
Percent of Emissions Reductions Between 2008 and 2020
Wilmington Area[1]

	NO_x	$PM_{2.5}$	ROG
EXISTING CONDITIONS Emission Reductions from Existing Controls and No Emission Reductions at Cap-and-Trade Industrial and Electricity Generation Facilities	**23%**	**24%**	**4%**
SCENARIO 1 Emission Reductions from Existing Controls and Emission Reductions at all Cap-and-Trade Industrial and Electricity Generation Facilities	**24%**	**25%**	**4%**
SCENARIO 2 Emission Reductions from Existing Controls and Emission Increases at all Cap-and-Trade Industrial and Electricity Generation Facilities	**22%**	**22%**	**3%**
SCENARIO 3 Emission Reductions from Existing Controls and Addition of New Facility	**23%**	**20%**	**4%**

Numbers are rounded to nearest percentage

[1] These tables include the combined emissions from mobile, area, and stationary sources. The industrial and electricity generation facilities covered by the proposed cap-and-trade regulation represent only a portion of these emissions. The emission impacts of the scenarios do not include the additional emissions reductions that will likely occur when transportation fuels and commercial and residential natural gas are included in the cap. The emissions reductions from transportation fuels and commercial and residential natural gas would affect each of these scenarios equally.

As described previously, while ARB staff did not find situations where emissions increases were clearly attributable to implementation of cap-and-trade, the second scenario evaluated the potential general impact of an emissions increase of 4 percent at every cap-and-trade industrial and electricity generation facility in the community region. This hypothetical upper-bound increase in emissions would slightly reduce the benefits of the ongoing control program, with a 2 percent reduction in $PM_{2.5}$ benefits, and a 1 percent reduction in NO_x and ROG benefits. However, cumulative emissions in the Wilmington area would still be lower in 2020, as compared to 2008.

Scenario 3 explored the potential emissions impacts of construction of a new combined heat and power unit at an existing refinery. Based on typical emissions from similar units, the addition of a hypothetical new unit in the community would slightly reduce the benefits of the ongoing control program, with a 4 percent reduction in $PM_{2.5}$ benefits, and a very small reduction that is less than 1 percent in NO_x and ROG benefits. Overall, cumulative emissions in the Wilmington area would still be lower in 2020, as compared to 2008.

Summary

In summary, air quality is improving throughout the Wilmington area. The assessment area meets both the federal annual $PM_{2.5}$ and 8-hour ozone standards, and the area is very close to meeting the daily $PM_{2.5}$ standard. California's ongoing co-pollutant emissions control programs will ensure that cumulative emissions will continue to decrease through 2020 in the Wilmington area, with associated health improvements from improved air quality.

While the cap-and-trade regulation allows for flexibility in how facilities comply, staff looked at several scenarios that bound the possibilities, including the construction of a new facility. If emissions reductions due to implementation of the cap-and-trade regulation occur locally at the fifteen facilities in Wilmington, there could be some small additional co-benefits from the reduction of combustion-related criteria pollutants. While emissions increases attributable to the cap-and-trade regulation are considered very unlikely, potential emissions increases that might occur in general are also expected to be small within the context of the larger cumulative emissions reductions that will be occurring as a result of California's extensive emissions control programs.

Oildale-Bakersfield Assessment

The Oildale/Bakersfield area (Bakersfield area) is located in the central portion of Kern County in the San Joaquin Valley Air Basin. It includes not only Oildale, but much of the Bakersfield urban area and the town of Shafter as well (See map in Appendix P: Co-Pollutant Emissions Assessment). Overall, about 425,000 people live in this area. In addition to significant mobile source emissions from trucks and passenger cars traveling along Highway 99 and Interstate 5, the Bakersfield area is adjacent to a number of oil fields, including two of the largest in California. The Kern River Oil Field to the east and northeast of Oildale has more than 9,000 active wells. It ranks second only to the Midway-Sunset Oil Field in southwestern Kern County. Other sizeable fields in the Bakersfield area include the Kern Front and Poso Creek oil fields north of Oildale and the smaller Fruitvale Oil Field to the southwest. In addition to the oil-related activities, the Bakersfield assessment area also contains a number of cogeneration facilities.

A total of 23 industrial and electricity generation facilities in the Bakersfield area would be subject to the cap-and-trade regulation. These facilities represent a mix of different types of operations. Appendix P: Co-Pollutant Emissions Assessment describes air quality and emissions in the assessment area and the traditional emissions control

programs currently in place. This section provides a discussion of the emissions changes that could occur under the cap-and-trade regulation.

As described above, ARB developed three hypothetical bounding scenarios to assess potential cumulative emissions impacts in 2020 in the Bakersfield area. For the third scenario (placing a new facility in the community), ARB evaluated the hypothetical construction of a new biorefinery within the Bakersfield area. The Low Carbon Fuel Standard and the federal renewable fuels standard have mandated that biofuels become a greater portion of transportation fuels, in order to reduce GHG emissions. Agricultural activities in the San Joaquin Valley generate materials that could be used to fuel a biorefinery. Table 4B-6 below, provides an estimate of criteria pollutant emissions from a hypothetical biofuel refinery with an annual capacity of 50 million gallons. Under California's existing regulatory structure, the construction of a new facility would be subject to the strict NSR permitting requirements described in Appendix P. This would include requirements to implement BACT, as well as to offset the emissions regionally. There is also the potential for increased truck traffic to deliver biomass to the plant. However, due to ARB regulations, in 2020 most trucks will be required to be equipped with the cleanest 2010 engines, as well as diesel particulate traps.

Table 4B-6
Estimated Criteria Pollutant Emissions
Hypothetical Biofuel Refining Facility
(50 million gallons/year capacity)

	Emissions (tons per day)		
	NO_x	**ROG**	**PM_{10}**
Cellulosic Ethanol Facility	0.26	0.69	0.27

Analysis of Potential Impacts

Under existing conditions, including rules adopted in the 2007 SIP to meet national air quality standards, the Bakersfield area would realize NO_x, $PM_{2.5}$, and ROG emissions reductions in 2020. The reductions will come primarily from on-road and off-road motor vehicles. As shown in Table 4B-7, these ongoing emissions reductions result in a 44 percent reduction in NO_x and an 11 percent reduction in both $PM_{2.5}$ and ROG emissions from 2008 levels.

The first scenario assumes that all the emissions reductions needed from the cap-and-trade regulation are implemented locally at the 23 industrial and electricity generation facilities in the Bakersfield area, realizing a further 4 percent reduction in co-pollutant emissions. Because emissions from the cap-and-trade industrial and electricity generation facilities comprise only a small portion of the overall inventory, these reductions translate into less than a 4 percent decrease in the total inventory for the Bakersfield area. In aggregate, full implementation of the cap-and-trade regulation by industrial and electricity generation sources locally would result in an additional

1 percent enhancement in localized NO_x reductions, and a small, less than 1 percent enhancement in localized $PM_{2.5}$ and ROG reductions. While not quantified here, combustion-generated toxic air contaminants would also likely decrease.

Table 4B-7
Percent Emissions Reductions Between 2008 and 2020
Bakersfield Area[1]

	NO_x	$PM_{2.5}$	ROG
EXISTING CONDITIONS Emission Reductions from Existing Controls and No Emission Reductions from Cap-and-Trade Industrial and Electricity Generation Facilities	**44%**	**11%**	**11%**
SCENARIO 1 Emission Reductions from Existing Controls and Emission Reductions at all Cap-and-Trade Industrial and Electricity Generation Facilities	**45%**	**11%**	**11%**
SCENARIO 2 Emissions Reductions from Existing Controls and Emission Increases at all Cap-and-Trade Industrial and Electricity Generation Facilities	**44%**	**10%**	**11%**
SCENARIO 3 Emissions Reductions from Existing Controls and Addition of New Facility	**44%**	**7%**	**9%**

Numbers are rounded to nearest percentage

[1] These tables include the combined emissions from mobile, area, and stationary sources. The industrial and electricity generation facilities covered by the proposed cap-and-trade regulation represent only a portion of these emissions. The emissions impacts of the scenarios do not include the additional emissions reductions that will likely occur when transportation fuels and commercial and residential natural gas are included in the cap. The emissions reductions from transportation fuels and commercial and residential natural gas would affect each of these scenarios equally.

As described previously, while ARB staff did not find situations where emissions increases were clearly attributable to implementation of cap-and-trade, the second scenario evaluated the potential general impact of an emissions increase of 4 percent at every cap-and-trade facility in the assessment area. This hypothetical upper-bound increase in emissions would slightly reduce the overall benefits of the ongoing control program, with a 1 percent reduction in $PM_{2.5}$ benefits, and a very small reduction that is less than 1 percent in NO_x and ROG benefits. However, cumulative emissions in the Bakersfield area would still be lower in 2020, as compared with 2008.

Scenario 3 explored the potential emissions impacts of constructing a new biofuel refining facility. Based on typical emissions from similar facilities, the addition of a hypothetical new facility in the Bakersfield area would slightly reduce the benefits of the

ongoing control program, with a 4 percent reduction in $PM_{2.5}$ benefits, 2 percent reduction in ROG benefits, and a small reduction that is less than 1 percent in NO_x benefits. However, overall, cumulative emissions in the Bakersfield area would still be lower in 2020, when compared with 2008.

Summary

In summary, air quality is improving throughout the Bakersfield area, and the assessment area is making progress toward meeting the federal $PM_{2.5}$ and 8-hour ozone standards. California's ongoing co-pollutant emissions control programs will ensure that cumulative emissions will continue to decrease through 2020 in the Bakersfield area, with associated health improvements from improved air quality.

While the cap-and-trade regulation allows for flexibility in how facilities comply, staff looked at several scenarios that bound the possibilities, including the construction of a new facility. If emissions reductions due to implementing the cap-and-trade regulation occur locally at the 23 facilities in the assessment area, there could be some small additional co-benefits from the reduction of combustion-related criteria pollutants. While emissions increases attributable to the cap-and-trade regulation are considered very unlikely, potential emissions increases that might occur in general are also expected to be small within the context of the larger cumulative emissions reductions that will be occurring as a result of California's extensive emissions control programs.

Richmond Assessment

The Richmond area, located on both the San Pablo and San Francisco Bays, encompasses portions of Contra Costa, Alameda, and Solano Counties, and includes portions of the cities of Richmond, El Cerrito, Berkeley, Emeryville, Benicia, and Alameda (See map in Appendix P: Co-Pollutant Emissions Assessment). The area is home to a racially and ethnically diverse population of over approximately 500,000 people and contains a wide range of stationary and mobile source emissions. These sources include the Port of Richmond and the Richmond Rail Yard, which produce diesel and fugitive emissions from bulk transport operations. In addition, the Richmond area is home to oil refineries, power plants, and major transportation corridors, as well as other industrial and commercial operations.

A total of seven industrial and electricity generation facilities in the Richmond area would be subject to a cap-and-trade program. Appendix P: Co-Pollutant Emissions Assessment describes air quality and emissions in the Richmond area and the traditional emissions control programs currently in place. This section provides a discussion of potential emissions changes that could occur under the cap-and-trade regulation.

As described above, ARB developed three hypothetical bounding scenarios to assess potential cumulative emissions impacts in 2020 in the Richmond area. For the third scenario (placing a new facility in the community), ARB evaluated the hypothetical construction of a new combined heat and power facility within the community. A

combined heat and power generation facility was selected because petroleum refining is the largest cap-and-trade emissions sector in the Richmond area. This would have the dual benefit of providing a more efficient heat source for refinery processes, while allowing excess power to be sold back to the grid. Table 4B-8, below, provides an estimate of criteria pollutant emissions from a hypothetical 85 megawatt (MW) combined heat and power unit. It is important to remember that under California's existing regulatory structure, the construction of a new facility would be subject to the strict NSR permitting requirements described in Appendix P: Co-Pollutant Emissions Assessment. This would include requirements to implement BACT, as well as to offset the emissions regionally.

Table 4B-8
Estimated Criteria Pollutant Emissions
Hypothetical Combined Heat and Power Facility
(85 MW Capacity)

	Emissions (tons per day)		
	NO_x	**ROG**	**$PM_{2.5}$**
Operating Emissions	0.11	0.05	0.12

Analysis of Impacts

Under existing conditions, including rules adopted in the 2007 SIP to meet national air quality standards, the Richmond area will realize further NO_x and ROG emissions reductions in 2020. The reductions will come primarily from on-road motor vehicle and off-road mobile sources, including light- and heavy-duty vehicles. These ongoing emissions reductions are summarized in Table 4B-9, and reflect a 25 percent reduction in NO_x and ROG emissions from 2008 levels. In contrast, the Richmond study area would see a slight increase of 1 percent in $PM_{2.5}$ (reflected as negative numbers in Table 4B-9), resulting from projected increases in area source emissions such as commercial cooking and residential fuel use, which are linked to population growth.

The first scenario assumes that all the emissions reductions needed from the cap-and-trade regulation are implemented locally at the seven industrial and electricity generation facilities in the Richmond area, realizing a further 4 percent reduction in co-pollutant emissions. Because emissions from the cap-and-trade industrial and electricity generation facilities comprise only a small portion of the overall inventory, these reductions translate into less than a 4 percent decrease in the total inventory for the Richmond area. In aggregate, full implementation of the cap-and-trade regulation by industrial and electricity generation sources locally would result in an additional 2 percent enhancement in localized NO_x reductions, a 1 percent reduction in $PM_{2.5}$, and a small enhancement, less than 1 percent, in localized ROG reductions. While not quantified here, combustion-generated toxic air contaminants would also likely decrease.

Table 4B-9
Percent of Emissions Reductions Between 2008 and 2020
Richmond Area[1]

	NO_x	$PM_{2.5}$	ROG
EXISTING CONDITIONS Emission Reductions from Existing Controls and No Emission Reductions at Cap-and-Trade Industrial and Electricity Generation Facilities	**28%**	**-1%**	**16%**
SCENARIO 1 Emissions Reductions from Existing Controls and Emission Reductions at all Cap-and-Trade Industrial and Electricity Generation Facilities	**30%**	**0%**	**16%**
SCENARIO 2 Emission Reductions from Existing Controls and Emission Increases at all Cap-and-Trade Industrial and Electricity Generation Facilities	**27%**	**-2%**	**14%**
SCENARIO 3 Emission Reductions from Existing Controls and Addition of New Facility	**28%**	**-2%**	**16%**

Numbers are rounded to nearest percentage

[1] These tables include the combined emissions from mobile, area, and stationary sources. The industrial and electricity generation facilities covered by the proposed cap-and-trade regulation represent only a portion of these emissions. The emissions impacts of the scenarios do not include the additional emissions reductions that will likely occur when transportation fuels and commercial and residential natural gas are included in the cap. The emissions reductions from transportation fuels and commercial and residential natural gas would affect each of these scenarios equally.

As described previously, while ARB staff did not find situations where emissions increases were clearly attributable to implementation of cap-and-trade, the second scenario evaluated the potential general impact of an emissions increase of four percent at every cap-and-trade facility in the community region. This hypothetical upper-bound increase in emissions would slightly reduce the overall benefits of the ongoing control program, with a 2 percent reduction in ROG benefits, a 1 percent reduction in NO_x benefits, and an additional 1 percent increase in $PM_{2.5}$. However, cumulative emissions of NO_x and ROG in the Richmond area would still be lower in 2020, as compared to 2008.

Scenario 3 explored the potential emissions impacts of construction of a new combined heat and power unit at an existing refinery. Based on typical emissions from similar units, the addition of a hypothetical new unit in the community would slightly reduce the benefits of the ongoing control program, with a very small reduction that is less than 1 percent in NO_x and ROG benefits, and an additional 1 percent increase in $PM_{2.5}$ emissions. Overall, cumulative emissions for NO_x and ROG in the Richmond area would still be lower in 2020, as compared to 2008.

Summary

In summary, air quality is improving throughout the Richmond area. The assessment area meets both federal $PM_{2.5}$ and 8-hour ozone standards. California's ongoing co-pollutant emissions control programs will ensure that cumulative emissions will continue to decrease through 2020 in the Richmond area, with associated health improvements from improved air quality.

While the cap-and-trade regulation allows for flexibility in how facilities comply, staff looked at several scenarios that bound the possibilities, including the construction of a new facility. If emissions reductions due to implementation of the cap-and-trade regulation occur locally at the seven facilities in Richmond, there could be some small additional co-benefits from the reduction of combustion-related criteria pollutants. While emissions increases attributable to the cap-and-trade regulation are considered very unlikely, potential emissions increases that might occur in general are also expected to be small within the context of the larger cumulative emissions reductions that will be occurring as a result of California's extensive emissions control programs.

Apple Valley/Oro Grande Assessment

The Apple Valley/Oro Grande area (hereafter called the Oro Grande area) is an economically and racially diverse area located in the Mojave Desert's Victor Valley. With the town of Oro Grande in the northwest, Apple Valley in the center, and Lucerne Valley in the southeast of the assessment area, this high desert region also includes the towns of Victorville, Hesperia, and Adelanto. About 230,000 people live in this portion of the Mojave Desert (See map in Appendix P: Co-Pollutant Emissions Assessment).

Although the Oro Grande area is more sparsely populated than the South Coast region to the south, the desert communities have grown over the last several decades as bedroom communities of the South Coast. Interstate 15 and Highway 395 act as thoroughfares, carrying significant amounts of commuter and truck traffic in and out of the Mojave Desert region.

Four industrial and electricity generation facilities in the Oro Grande area would be subject to the cap-and-trade regulation. Appendix P describes air quality and emissions in the Oro Grande area and the traditional emissions-control programs currently in place. This section provides a discussion of potential emissions changes that could occur under the cap-and-trade regulation.

As described above, ARB developed three hypothetical bounding scenarios to assess potential cumulative emissions impacts in 2020 in Oro Grande. For the third scenario (placing a new facility in the community), ARB evaluated the hypothetical construction of a new natural gas power plant. Due to requirements of the Renewable Energy Standard and other initiatives, there may be an increase in natural gas-fueled power generation, as compared to more carbon-intensive coal, in order to reduce GHG emissions. Given that the Oro Grande area already contains one small power facility, ARB staff evaluated the potential emissions from an additional natural gas facility. Table 4B-10, below, provides an estimate of criteria pollutant emissions from a hypothetical 500 megawatt (MW) combined-cycle natural gas power plant. It is important to remember that under California's existing regulatory structure, the construction of a new facility would be subject to the strict NSR permitting requirement described in Appendix P: Co-Pollutant Emissions Assessment. This would include requirements to implement BACT, as well as offset the emissions regionally.

Table 4B-10
Estimated Criteria Pollutant Emissions
Hypothetical Combined-Cycle Natural Gas Baseload Power Plant
(500 MW Capacity)

	Emissions (tons per day)		
	NO_x	**ROG**	**PM_{10}**
Operating Emissions	0.31	0.11	0.27

Analysis of Potential Impacts

Under existing conditions, including rules adopted in the 2007 SIP to meet national air quality standards, the Oro Grande area would still realize NO_x, $PM_{2.5}$, and ROG emissions reductions in 2020. The reductions will come primarily from on-road and off-road motor vehicles. As shown in Table 4B-11, these ongoing emissions reductions result in a 16 percent reduction in NO_x, 2 percent reduction in $PM_{2.5}$, and 3 percent reduction in ROG emissions from 2008 levels.

The first scenario assumes that all the emissions reductions needed from the cap-and-trade regulation are implemented locally at the four industrial and electricity generation facilities in the Oro Grande area, realizing a further 4 percent reduction in co-pollutant emissions. Because emissions from the cap-and-trade industrial and electricity generation facilities comprise only a small portion of the overall inventory, these reductions translate into less than a 4 percent decrease in the total inventory for the Oro Grande area. In aggregate, full implementation of the cap-and-trade regulation by industrial and electricity generation sources locally would result in an additional 3 percent enhancement in localized NO_x benefits, and an additional 1 percent enhancement in both the $PM_{2.5}$ and ROG benefits (Table 4B-11). While not quantified here, combustion-generated toxic air contaminants would also likely decrease.

Table 4B-11
Percent Emissions Reductions Between 2008 and 2020
Oro Grande Area[1]

	NO_x	$PM_{2.5}$	ROG
EXISTING CONDITIONS Emission Reductions from Existing Controls and No Emission Reductions at Cap-and-Trade Industrial and Electricity Generation Facilities	**16%**	**2%**	**3%**
SCENARIO 1 Emissions Reductions from Existing Controls and Emission Reduction at all Cap-and-Trade Industrial and Electricity Generation Facilities	**19%**	**3%**	**4%**
SCENARIO 2 Emission Reductions from Existing Controls and Emission Increases at all Cap-and-Trade Industrial and Electricity Generation Facilities	**14%**	**0%**	**3%**
SCENARIO 3 Emissions Reductions from Existing Controls and Addition of New Facility	**16%**	**-1%**	**3%**

Numbers are rounded to nearest percentage

[1] These tables include the combined emissions from mobile, area, and stationary sources. The industrial and electricity generation facilities covered by the proposed cap-and-trade regulation represent only a portion of these emissions. The emissions impacts of the scenarios do not include the additional emissions reductions that will likely occur when transportation fuels and commercial and residential natural gas are included in the cap. The emissions reductions from transportation fuels and commercial and residential natural gas would affect each of these scenarios equally.

As described previously, while ARB staff did not find situations where emissions increases were clearly attributable to implementation of cap-and-trade, the second scenario evaluated the potential general impact of an emissions increase of 4 percent at every cap-and-trade facility in the community region. This hypothetical upper-bound increase in emissions would slightly reduce the overall benefits of the ongoing control program, with a 2 percent reduction in both NO_x and $PM_{2.5}$ benefits, and a small reduction, less than 1 percent, in ROG benefits. However, cumulative emissions in the Oro Grande area would still be lower in 2020, as compared to 2008, for both NO_x and ROG, while $PM_{2.5}$ emissions would remain constant.

Scenario 3 explored the potential emissions impacts of constructing a new natural gas power plant in the local area. Based on typical emissions from similar facilities, the addition of a hypothetical new facility would slightly reduce the overall benefits of the ongoing control program, with a small reduction, less than 1 percent, in NO_x and ROG benefits and a 1 percent increase in $PM_{2.5}$. Overall, cumulative emissions in the

Oro Grande area would still be lower in 2020, as compared to 2008, for both NO_x and ROG, while $PM_{2.5}$ emissions would increase slightly.

Summary

In summary, air quality is improving throughout the Oro Grande area. The assessment area meets the federal $PM_{2.5}$ standards and shows continued progress toward meeting the federal ozone standard. California's ongoing co-pollutant emissions control programs will ensure that cumulative emissions will continue to decrease through 2020 in the Oro Grande area, with associated health improvements from improved air quality.

While the cap-and-trade regulation allows for flexibility in how facilities comply, staff looked at several scenarios that bound the possibilities, including the construction of a new facility. If emissions reductions due to implementing the cap-and-trade regulation occur locally at the four facilities in the assessment area, there could be some small additional co-benefits from the reduction of combustion-related criteria pollutants. While emissions increases attributable to the cap-and-trade regulation are considered very unlikely, potential emissions increases that might occur in general are also expected to be small within the context of the larger cumulative emissions reductions that will be occurring as a result of California's extensive emissions control programs.

d. Mitigation

Generally, the federal, state and local governments all share responsibility for reducing air pollution. ARB is California's lead air agency and controls emissions from mobile sources, fuels, consumer products as well as air toxics. At the federal level, the U.S. EPA has oversight of state programs. The U.S. EPA has authority to control emissions from mobile sources blocked from state control, such as ships, trains and airplanes.

The responsibility for controlling emissions of criteria pollutants and TACs from stationary sources (e.g. refineries, power plants) rests with the local air districts. The air districts do this through a combination of prohibitory rules, which set emission limits that vary by facility type; operating permits that specify equipment use and other operating parameters for a facility to limit emissions; and a NSR program designed to accommodate industrial growth while mitigating environmental impacts.

The Emissions Assessment (Appendix P) and the Regulatory Framework appended to this FED identify the statutes and regulations, prohibitory rules, operating permit requirements and other programs designed to limit emissions and mitigate environmental impacts. Other rules and regulations may exist. Some of the rules and regulations to limit impacts from criteria pollutants and TACs include:

- Mandatory compliance with the Federal Clean Air Act and California Air Quality Regulations. Projects are subject to NSR and BACT criteria.

- Mandatory permitting, monitoring, and reporting ensure that emission control equipment is properly maintained.
- Restriction of construction during windy periods.
- Site design to limit grading, restriction of construction activities during windy conditions, and the use of watering trucks can minimize dust (particulate) generation during site development or other construction activities.
- Proper maintenance of construction equipment and emission control devices.
- Minimize idling of heavy construction and diesel equipment.
- Extension of electrical service to construction sites rather than reliance on ICE generators to provide electricity.
- Utilize the adaptive management approach (as summarized below and described in greater detail in the Project Description).

Based on the available data and current law and policies that control localized air pollution, and expected compliance responses to the cap-and-trade regulation, ARB concludes that, increases in localized air pollution, including toxic air contaminants and criteria air pollutants, attributable to the cap-and-trade program are extremely unlikely. ARB cannot, however, say that increases would never occur, and that any such increases would never have implications for public health. ARB seeks to ensure that the cap-and-trade program, as it operates over time, avoids and minimizes all instances of localized air quality impacts. As discussed in the project description, ARB will implement adaptive management.

ARB already receives annual GHG emission information from covered sources. The regulation will also require the submittal of compliance instruments, allowances and offsets, to meet a portion of an entity's annual emissions each year, and the submittal of compliance instruments to meet all emissions during a compliance period at the end of each compliance period. ARB will also receive information from the Industrial Energy Efficiency Audit regulation in 2012, and solicit information about new and modified permits for covered entities from local air districts. ARB will evaluate the data both against previous years' data and at the end of each compliance period to determine whether there are any disproportionate impacts to low-income communities (Health and Safety Code, § 38562(b)(2)) or any increases in the emissions of toxic air contaminants or criteria air pollutants (Health and Safety Code, § 38570(b)(2)). ARB will consult and coordinate with local air districts, as appropriate and necessary, in these evaluations.

ARB will post GHG emission information, as well as each entity's submission of allowances and offsets for compliance, on its website or otherwise make this information publicly available. In addition, ARB will solicit comments from the public and stakeholders. This reported and solicited information will become part of ARB's periodic review of the cap-and-trade program. This review will include an opportunity for public review and comment.

If unanticipated adverse localized air quality impacts are identified during this periodic review and they are substantial enough to interfere with or undermine the achievement of the objectives for the cap-and-trade program as defined by AB 32, including the objectives set forth in 38562(b) and 38570(b), ARB commits to promptly developing and implementing appropriate responses.

Potential responses ARB would consider, if warranted, include, but are not limited to, using allowance value to fund construction of local mitigation projects that eliminate localized air impacts (e.g., funding the purchase of low-emission buses or fleet upgrades); providing incentives for energy efficiency and other emission reduction activities within the community; or instituting more stringent requirements for compliance responses in specifically identified, impacted communities (e.g., restricting trading). These potential future responses are not, however, warranted based on currently available information, and, accordingly, their imposition today would not be supported by substantial evidence and would unnecessarily conflict with AB 32's other objectives.

As discussed above, ARB believes that it is highly unlikely that actions implemented by covered entities to comply with the cap-and-trade regulation could result in an increase in emissions large enough to pose an adverse health impact to sensitive receptors after application of existing air quality controls and/or regulations. While ARB's commitment to adaptive management would reduce the risks of unintended, significant adverse air quality impacts from occurring from an existing facility as a result of the cap-and-trade regulation, it may not be feasible to entirely eliminate them. Due to abundance of caution, the uncertainty regarding the potential for emission increases of criteria pollutants and TACs at existing facilities located near sensitive receptors, and recognizing that the authority to approve local projects, evaluate project-level impacts and require mitigation lies with project-permitting agencies and not ARB, the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that this potentially significant environmental impact may be unavoidable.

Because the authority to determine project-level impacts and require project-level mitigation lies with the permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant impact resulting from short-term construction emissions may be unavoidable.

5. Biological Resources

This section evaluates potential environmental impacts that could result from implementation of the covered entity compliance responses. The reasonably foreseeable covered entity compliance responses are (1) Upgrade Equipment, (2)

Decarbonization, (3) Implement Process Changes, and (4) Surrender Compliance Instruments.

a. Impact Analysis

Implementation of the covered entity compliance responses is expected to pose a potentially significant impact to biological resources.

Upgrade Equipment

This compliance response entails upgrading, retrofitting, and/or replacement of aging equipment at existing facilities. Equipment improvements would consist of modifications to existing equipment and/or installation of new equipment at existing facilities. It is possible that incidental new structures, such as ancillary outbuildings, covered shelters, or onsite utility lines might be necessary to accommodate some improvements.

Most existing industrial facilities exist on sites that are/have been subjected to severe disturbance including grading, trenching, paving, and construction of roads and structures. Daily activities often include the presence of humans, movement of automobiles, trucks and heavy equipment, and operation of stationary equipment. This environment is not considered conducive to the many biological resources. Vegetation is often removed or controlled and wildlife displaced to more suitable surroundings. Nonetheless, there are plant and animal species which occur, or even thrive, in developed settings. As a consequence, activities which require disturbance of undeveloped area, such as the construction of outbuildings, trenching for utility lines, or paving have the potential to adversely affect plant or animal species that may reside in those areas. Consequently, construction activities that disturb undeveloped areas pose a potentially significant impact to biological resources. This impact could be reduced to a less than significant level by mitigation at the local level that is beyond the authority of the ARB to implement.

Decarbonization

This compliance response entails switching to less carbon intensive fuels. Any equipment modifications required to accommodate new fuels would be accomplished at existing facilities, primarily within existing structures, and would not be expected to pose a significant adverse impact to biological resources. However, as described above, placement of new tanks, fuel storage structures, or other disturbance of an undeveloped area poses a potentially significant adverse impact to biological resources.

Implement Process Changes

This compliance response entails altering monitoring, maintenance, and repair procedures or processes at existing industrial facilities, or altering the manner in which an industrial process is accomplished, to reduce GHG emissions. None of these activities would be expected to require the disturbance of undeveloped area. As such, this compliance response would pose less than significant adverse biological impacts.

A possible increased demand for natural pozzolans would not be expected to cause mining operations to significantly expand spatially or increase output beyond existing

permitted capacities; and would not pose a less than significant adverse impact to biological resources.

Surrender Compliance Instruments

This compliance response represents the obligation of each covered entity to surrender compliance instruments, i.e. allowances or offset credits equal to their GHG emissions. The transaction of allowances or offset credits would have No Impact on environmental resources. Design of the cap-and-trade program with and without offsets is evaluated in the Alternatives Analysis section, and the potential environmental effects that could result from offset projects are described in the respective protocol impact analysis sections of this FED.

b. Mitigation

Recognized Measures

The appended Regulatory Framework identifies statutes and regulations that provide regulatory protection of biological resources. Additional statutes and regulations may exist. ARB does not have the authority to require implementation of mitigation that could reduce this impact to a less than significant level. The ability to require such measures is under the purview of jurisdictions with local permitting authority. Project-specific impacts and mitigation would be identified during the environmental review by agencies with regulatory authority. Recognized practices that are routinely required to avoid and/or minimize impacts to biological resources include:

- Proposed activities could qualify as a “project” under CEQA. The jurisdiction with primary permitting authority over a proposed action is the Lead Agency and required to review the proposed action for compliance with CEQA statutes.

- Preparation of a biological inventory of site resources by a qualified biologist prior to ground disturbance or construction. If protected species or their habitats are present, comply with applicable federal and state endangered species acts and regulations. Ensure that important fish or wildlife movement corridors or nursery sites are not impeded by project activities.

- Preparation of a wetland survey of onsite resources. Establish setbacks and prohibit disturbance of riparian habitats, streams, intermittent and ephemeral drainages, and other wetlands. Wetland delineation is required by Section 3030(d) of the Clean Water Act administered by the U.S. Army Corps of Engineers.

- Prohibit construction activities during the rainy season with requirements for seasonal weatherization and implementation of erosion prevention practices.

- Prohibit construction activities in the vicinity of raptor nests during nesting season or establish protective buffers and provide monitoring as needed to ensure that project activity does not cause an active nest to fail.

- Preparation of site design and development plans that avoid or minimize disturbance of habitat and wildlife resources, and prevents stormwater discharge that could contribute to sedimentation and degradation of local waterways. Depending on disturbance size and location, a National Pollution Discharge Elimination System (NPDES) construction permit may be required from the California State Water Resources Control Board.

- Plant replacement trees and establish permanently protection suitable habitat at ratios considered acceptable to comply with "no net loss" requirements.

Mitigation

Because the authority to determine project-level impacts and require project-level mitigation lies with the permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant impact to biological resources resulting from site disturbance, grading, and trenching may be unavoidable.

6. Cultural Resources

This section evaluates potential environmental impacts that could result from implementation of the covered entity compliance responses. The reasonably foreseeable covered entity compliance responses are (1) Upgrade Equipment, (2) Decarbonization, (3) Implement Process Changes, and (4) Surrender Compliance Instruments.

a. Impact Analysis

Implementation of the covered entity compliance responses is expected to pose a potentially significant impact to cultural resources.

Upgrade Equipment

This compliance response entails upgrading, retrofitting, and/or replacement of aging equipment at existing facilities. Equipment improvements would consist of modifications to existing equipment and/or installation of new equipment at existing facilities. It is possible that incidental new structures, such as ancillary outbuildings, covered shelters, or onsite utility lines might be necessary to accommodate some improvements.

Most developed properties have been subjected to varying degrees of disturbance including such activities as grading, trenching, paving, and construction of roads and structures. Nonetheless, activities that require disturbance of the soil, such as the construction of outbuildings, trenching for utility lines, or grading have the potential to adversely affect cultural resources that may exist in those areas. Specific details on the magnitude and type of impacts cannot be determined and would be dependent upon the amount of area disturbed and the cultural sensitivity of individual site. The types of

cultural resources that could potentially be affected with facility construction could include, but are not limited to, prehistoric and historical archaeological sites, paleontological resources, historic buildings, structures, or archaeological sites. Properties important to Native American communities and other ethnic groups, including tangible properties possessing intangible traditional cultural values could also be impacted.

Consequently, construction activities that disturb undeveloped area pose a potentially significant impact to cultural resources. This impact could be reduced to a less than significant level by mitigation at the local level that is beyond the authority of the ARB to implement.

Decarbonization

This compliance response entails switching to less carbon intensive fuels. Any equipment modifications required to accommodate new fuels would be accomplished at existing facilities, primarily within existing structures, and pose a less than significant adverse impact to cultural resources. However, placement of new tanks, fuel storage structures, or other actions requiring disturbance of an undeveloped area pose a potentially significant adverse impact to cultural resources.

Implement Process Changes

This compliance response entails altering monitoring, maintenance, and repair procedures or processes at existing industrial facilities, or altering the manner in which an industrial process is accomplished, to reduce GHG emissions. None of these activities would be expected to require the disturbance of undeveloped area. As such, this compliance response would have a less than significant impact on cultural resources.

A possible increased demand for natural pozzolans to be added to concrete would not be expected to cause mining operations to significantly expand spatially or increase output beyond existing permitted capacities; and would pose less than significant adverse impact to cultural resources.

Surrender Compliance Instruments

This compliance response represents the obligation of each covered entity to surrender compliance instruments, i.e. allowances or offset credits equal to their GHG emissions. The transaction of allowances or offset credits would have No Impact on environmental resources. Design of the cap-and-trade program with and without offsets is evaluated in the Alternatives Analysis section, and the potential environmental effects that could result from offset projects are described in the respective protocol impact analysis sections of this FED.

b. Mitigation

Recognized Measures

The appended Regulatory Framework identifies statutes and regulations that provide regulatory protection of cultural resources. Additional statutes and regulations may exist. ARB does not have the authority to require implementation of mitigation that could reduce this impact to a less than significant level. The ability to require such measures is under the purview of jurisdictions with local permitting authority. Project-specific impacts and mitigation would be identified during the environmental review by agencies with regulatory authority. Recognized practices that are routinely required to avoid and/or minimize impacts to cultural resources include:

Proposed activities could qualify as a "project" under CEQA. The jurisdiction with primary permitting authority over a proposed action is the Lead Agency and required to review the proposed action for compliance with CEQA statutes.

A cultural resources site survey shall be performed by a qualified archaeologist or cultural specialist that conforms to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61 (36 CFR Part 61).

The State Historic Preservation Officer and federal lead agencies shall be contacted as appropriate for coordination of Nation-to-Nation consultations with the Native American Tribes.

A qualified paleontological resources specialist shall be consulted to determine whether paleontological resources would likely be disturbed in a project area on the basis of the sedimentary context of the area and a records search for past paleontological finds in the area. The assessment may suggest areas of high known potential for containing resources. If the assessment is inconclusive a surface survey is recommended to determine the fossilferous potential and extent of the pertinent sedimentary units within the project site. If the site contains areas of high potential for significant paleontological resources and avoidance is not possible, prepare a paleontological resources management and mitigation plan.

- Consult established archaeological and historical records and conduct field survey the project site prior to construction. Survey records shall be fled with appropriate archaeological or historical data centers.

- Consult with local Native American representatives as appropriate to obtain local knowledge of the project vicinity.

- Prepare site development and grading plans that avoid disturbance of known cultural sites and/or documented sensitive areas. Project plans shall include appropriate measures to protect sensitive resources.

Retain a qualified archaeologist or Native American representative to monitor site development activities, particularly grading and trenching. If artifacts are observed during construction, require that construction be halted until a qualified archaeologist has been consulted.

Mitigation

Because the authority to determine project-level impacts and require project-level mitigation lies with the permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant impact to cultural resources resulting from site disturbance, grading and trenching may be unavoidable.

7. Energy Demand

This section evaluates potential impacts that could result from implementation of the covered entity compliance responses. The reasonably foreseeable covered entity compliance responses are (1) Upgrade Equipment, (2) Decarbonization, (3) Implement Process Changes, and (4) Surrender Compliance Instruments.

Compliance response by covered entities would be implemented to reduce GHG emissions, primarily through increased energy efficiency, notably fuel combustion. Such actions are not expected to conflict with adopted energy conservation plans, result in the need for new or substantially altered power or natural gas utility systems, create any significant effects on peak and base period demands for electricity and other forms of energy. As energy efficiency improvements, these actions would comply with energy standards.

a. Impact Analysis

In 2010, ARB prepared the Updated Economic Analysis of California's Climate Change Scoping Plan. The baseline energy demand and assumptions used in the economic analysis are consistent with those from the CEC Integrated Energy Policy Report (CEC 2009) and the U.S. DOE, Energy Information Administration (U.S. EPA EIA 2008).

The updated economic analysis indicates the 2010 California energy demand as approximately 6,150 trillion BTUs. Under business-as-usual (BAU) conditions, statewide energy use would grow to an estimated 6,500 TBtu in 2020. Implementation of foreseeable GHG reduction measures including California Clean Cars, LCFS, Renewables Portfolio Standard (RPS), SB 375 Regional Targets, and the RES could reduce 2020 energy demand by an estimated 4 percent to approximately 6,240 TBtu. The cap-and-trade regulation would provide additional energy reductions that would vary depending upon the price of carbon in the market. ARB evaluated economic impacts of carbon prices ranging from $15 to $75 per ton. It is possible prices could occur outside of this range. At the low end of the predicted price range, the cap-and-

trade regulation could achieve an estimated reduction of energy demand of 200 TBtu (±3 percent). At the high end of the price range, the reduction in energy demand could be approximately 500 TBtu (8 percent). As such, implementation of compliance responses by covered entities is expected to reduce energy demand and is considered a beneficial effect.

Upgrade Equipment

This compliance response entails upgrading, retrofitting, and/or replacement of aging equipment at existing facilities. Equipment improvements would consist of modifications to existing equipment and/or installation of new equipment at existing facilities. It is possible that incidental new structures, such as ancillary outbuildings, covered shelters, or onsite utility lines might be necessary to accommodate some improvements. The purpose of upgrading, retrofitting, and/or replacing aging equipment is to reduce GHG emissions, but the primary mechanism to achieve GHG reductions is increased combustion efficiency which results in reduced fuel consumption. Using less fuel equates to using less energy and is considered a beneficial effect.

Decarbonization

This compliance response can best be described as switching to less carbon intensive fuels. Changing fuels would not alter the amount of energy required by any given process, but using cleaner fuels could reduce GHG emissions.

Implement Process Changes

This compliance response entails altering monitoring, maintenance, and repair procedures at existing industrial, business or commercial facilities, or altering the manner in which an industrial process is accomplished in order to reduce emissions. These activities would reduce energy loss from leakage, operation of poorly maintained equipment, and inefficient processes. This compliance response would have a beneficial reduction in energy demand.

Cement production consumes a significant amount of energy. Increased use of pozzolans reduces the amount of cement required to make concrete. Reducing the amount of cement reduces the amount of energy required per unit of concrete, representing a beneficial reduction in energy demand.

Increased use of recycled glass and steel requires less energy than production from raw materials. This would be a beneficial reduction in energy demand.

Surrender Compliance Instruments

This compliance response represents the obligation of each covered entity to surrender compliance instruments, i.e. allowances or offset credits equal to their GHG emissions. The transaction of allowances or offset credits would have No Impact on environmental resources. Design of the cap-and-trade program with and without offsets is evaluated in the Alternatives Analysis section, and the potential environmental effects that could result from offset projects are described in the respective protocol impact analysis sections of this FED.

b. Mitigation

The covered entity compliance responses pose less than significant impacts, and in most instances have the potential to provide beneficial reductions in energy demand. Mitigation is not warranted.

8. Geology, Soils, and Minerals

This section evaluates potential impacts that could result from implementation of the covered entity compliance responses. The reasonably foreseeable covered entity compliance responses are (1) Upgrade Equipment, (2) Decarbonization, (3) Implement Process Changes, and (4) Surrender Compliance Instruments.

a. Impact Analysis

Implementation of the covered entity compliance responses could pose a potentially significant impact to geology, soils and minerals.

The compliance responses are not expected to cause or rupture a known earthquake fault, result in strong seismic ground shaking, or seismic-related ground failure. Implementation of the compliance responses would occur at existing industrial, business or commercial sites that might already be located on unstable geologic or soil units. However, the envisioned improvements are not of such magnitude as to cause soil instability, or significantly contribute to landslide, lateral spreading, subsidence, liquefaction or collapse. Site disturbance for incidental construction of ancillary structures could increase erosion and consequent sedimentation of local waterways, posing a potentially significant adverse impact.

Upgrade Equipment

This compliance response entails upgrading, retrofitting, and/or replacement of aging equipment at existing facilities. Equipment improvements would consist of modifications to existing equipment and/or installation of new equipment at existing facilities. It is possible that incidental new structures, such as ancillary outbuildings, covered shelters, or onsite utility lines might be necessary to accommodate some improvements.

Construction of auxiliary structures would require basic site preparation such as foundation grading, trenching, and emplacement of utility lines. These activities could increase erosion and consequent sedimentation of local waterways, posing a potentially significant adverse impact. Mitigation is warranted.

Decarbonization

This compliance response entails switching to less carbon intensive fuels. Any equipment modifications required to accommodate new fuels would be accomplished at existing facilities. Construction, grading, trenching and general site disturbance for fuel tanks, storage structures and lines could increase erosion and consequent sedimentation of local waterways, posing a potentially significant impact.

Implement Process Changes

This compliance response entails altering monitoring, maintenance, and repair procedures at existing industrial, business or commercial facilities, or altering the manner in which an industrial process is accomplished in order to reduce emissions. These activities would be not expected to adversely affect geology, soil or mineral conditions. This would be a less than significant impact.

Increased use of pozzolans is a potential process change in the cement sector. The addition of natural pozzolans, fly ash, or slag to concrete reduces the amount of cement required, proportionately reducing GHG emissions associated with cement production. Natural pozzolans are geologic materials, primarily of volcanic origin. Regional sources of natural pozzolans include existing mining operations in California and western Nevada. Considering that pozzolans such fly ash and slag are readily available from other industrial processes, any increased use of pozzolans to reduce GHG emissions would not cause substantial expansion of mining of natural pozzolans. This would be a less than significant impact.

Surrender Compliance Instruments

This compliance response represents the obligation of each covered entity to surrender compliance instruments, i.e. allowances or offset credits equal to their GHG emissions. The transaction of allowances or offset credits would have No Impact on environmental resources. Design of the cap-and-trade program with and without offsets is evaluated in the Alternatives Analysis section, and the potential environmental effects that could result from offset projects are described in the respective protocol impact analysis sections of this FED.

b. Mitigation

Recognized Measures

The appended Regulatory Framework identifies statutes and regulations that provide regulatory protection of biological resources. Additional statutes and regulations may exist. ARB does not have the authority to require implementation of mitigation that could reduce this impact to a less than significant level. The ability to require such measures is under the purview of jurisdictions with local permitting authority. Project-specific impacts and mitigation would be identified during the environmental review by agencies with regulatory authority. Recognized practices that are routinely required to avoid and/or minimize impacts to geologic resources include:

- Proposed activities could qualify as a “project” under CEQA. The jurisdiction with primary permitting authority over a proposed action is the Lead Agency and required to review the proposed action for compliance with CEQA statutes.

- Prepare a grading plan accompanied by an erosion and sediment control plan. This is a standard requirement for most construction activities imposed local jurisdictions with permitting authority.

- Complete geotechnical and engineering analyses prior to construction of buildings or structures.
- Design and construct structures consistent with Uniform Building Code specifications, including conformance with requirements that address local seismic conditions.
- Avoid placement of structures on steep slopes, alluvial fans, and other areas prone to landslides or flash floods, or with gullies or washes.
- Limit construction activities during wet weather and the winter season. If work cannot be completed before winter, disturbed areas shall be winterized to minimize erosion.
- Implement BMPs to minimize erosion and sedimentation including use of filter berms, sandbag or straw bale barriers, siltation retention fences, vegetated buffer strips, vegetated swales, and spill containment provisions
- Provide prompt restoration and revegetation of disturbed areas following completion of construction.

Mitigation

Because the authority to determine project-level impacts and require project-level mitigation lies with the permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant elevated risk of soil erosion and consequent sedimentation of local waterways resulting from site disturbance, grading, and trenching may be unavoidable.

9. Greenhouse Gases

This section evaluates potential GHG impacts that could result from implementation of the proposed cap-and-trade program. Evaluation of criteria pollutants and TAC is presented in the Air Quality chapter.

a. Impact Analysis

ARB estimates the 2010 GHG emissions baseline to be 462 $MMTCO_2e$. The existing conditions projected to 2020 are estimated to be 507 $MMTCO_2e$. As of 2010, there are 21 ongoing or adopted AB 32 Scoping Plan measures that would achieve an estimated 58 $MMTCO_2e$ reductions by 2020, and one foreseeable measure (Advanced Clean Cars) that would reduce approximately 4 $MMTCO_2e$, resulting in 2020 statewide emissions of 445 $MMTCO_2e$. The AB 32 emissions reduction target is 427 $MMTCO_2e$. The proposed cap-and-trade regulation would need to reduce 18 $MMTCO_2e$, i.e. the

balance needed to reach the 427 $MMTCO_2e$ target if all of the Scoping Plan measures achieve their expected reductions. If any measures are less effective than envisioned, cap-and-trade would need to achieve greater reductions to make up any shortfall.

All of the compliance responses would reduce long-term GHG emissions consistent with the declining emissions cap. None of the identified compliance responses would be expected to produce a net increase in long-term GHG emissions, either directly or indirectly, that could have a significant adverse impact on the environment, or conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs. Reduction of GHG emissions is a beneficial effect.

b. Compliance Responses

This section evaluates potential impacts that could result from implementation of the covered entity compliance responses. The reasonably foreseeable covered entity compliance responses are (1) Upgrade Equipment, (2) Decarbonization, (3) Implement Process Changes, and (4) Surrender Compliance Instruments.

Upgrade Equipment

This compliance response entails upgrading, retrofitting, and/or replacement of aging equipment at existing facilities. Equipment improvements would consist of modifications to existing equipment and/or installation of new equipment at existing industrial, business, and/or commercial facilities. It is possible that incidental new structures, such as ancillary outbuildings, covered shelters, tanks and/or onsite utility lines might be necessary to accommodate some improvements.

Upgrading, retrofitting, and/or replacement of aging equipment at existing facilities to achieve long-term GHG emission reductions would result in a long-term beneficial effect.

Construction activities, possibly including the operation of heavy equipment, could emit GHG during installation of equipment upgrades and/or incidental construction. These emissions would be short-term and considered less than significant.

Decarbonization

This compliance response entails switching to less carbon intensive fuels. Any equipment modifications required to accommodate new fuels would be accomplished at existing facilities. Potential construction impacts that might occur with installation of tanks, other fuel storage structures, and/or utility lines are described above.

Switching to a less carbon intensive energy source would reduce GHG emissions and represents a beneficial effect, and a beneficial effect.

Construction activities for the installation of fuel tanks, storage structures, and lines could produce GHG emissions. These emissions would be short-term and considered less than significant.

Implement Process Changes

This compliance response entails altering monitoring, maintenance, and repair procedures at existing industrial, business or commercial facilities, or altering the manner in which an industrial process is accomplished in order to reduce emissions. Implementing processes that reduce GHG emissions represents a beneficial effect, and a beneficial effect.

Surrender Compliance Instruments

This compliance response represents the obligation of each covered entity to surrender compliance instruments, i.e. allowances or offset credits equal to their GHG emissions. The transaction of allowances or offset credits would have No Impact on GHG emissions. Design of the cap-and-trade program with and without offsets is evaluated in the Alternatives Analysis section. Offset projects would result in global reduction of GHG emissions. The potential environmental effects that could result from offset projects are described in the respective protocol impact analysis sections of this FED.

c. Mitigation

Mitigation is not warranted.

10. Hazards and Hazardous Materials

This section evaluates potential impacts that could result from implementation of the covered entity compliance responses. The reasonably foreseeable covered entity compliance responses are (1) Upgrade Equipment, (2) Decarbonization, (3) Implement Process Changes, and (4) Surrender Compliance Instruments.

a. Impact Analysis

As described below, changes in the use, handling, storage, or transportation of hazardous materials that could result from implementation of the covered entity compliance responses would be expected to result in less than significant impacts. The compliance responses would not be expected to produce safety hazards to people residing or working in or near affected facilities, would not impair implementation of or physically interfere with adopted emergency response plans or emergency evacuation plans, and would not expose people or structures to a significant risk of loss, injury or death involving wildland fires.

Upgrade Equipment

This compliance response entails upgrading, retrofitting, and/or replacement of aging equipment at existing facilities. Equipment improvements would consist of modifications to existing equipment and/or installation of new equipment at existing facilities. It is possible that incidental new structures, such as ancillary outbuildings, covered shelters, or onsite utility lines might be necessary to accommodate some improvements.

Virtually all industrial facilities use some products that are classified as hazardous which include such common things as cleaning agents, petroleum products and fuels. The distinction between home use and industrial application is often simply the volume of

material stored and used. Implementation of this compliance response could result in increased or reduced use of hazardous materials that may or may not already be used at individual facilities. It is possible that existing facilities may be located within one-quarter mile of an existing or proposed school, or on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5.

Hazardous materials are subject to work place health and safety regulations that include handling instructions, spill prevention and cleanup plans, and emergency procedures. Implementation of this compliance response is not expected to introduce any hazardous material that is not already in use and subject to federal, state, and/or local regulation of transport, storage, use, and disposal. Accordingly, this compliance response would not be expected to significantly increase or decrease the volume or type of hazardous materials in use or the consequent potential exposure of persons or the environment to hazardous materials through routine transport, use, or disposal. This compliance response poses a less than significant impact.

Decarbonization

This compliance response entails switching to fuels with less carbon content. Any equipment modifications required to accommodate new fuels would be accomplished at existing facilities. Switching fuels could require the installation or modification of tanks and/or other fuel storage equipment or structures.

Because of their flammability, most fuels are classified as hazardous materials. Based on the premise that existing fuels are already stored onsite, changing to a different fuel would not represent the introduction of a hazardous material where none previously existed, but could result in a change in the type of hazard posed. However, with the exception of used tires, all of the fuels contemplated by this compliance response are in common use throughout the U.S. and subject to transport, handling, use, and disposal regulations. Switching fuels is consistent with the type of business decisions that occur from time-to-time at industrial and manufacturing facilities.

As a fuel, used tires provide high BTU content and long burning times. Modern combustion technology coupled and control systems are being developed to reduce the undesirable emissions of tire combustion. Emissions testing of an increased use of tires in the range of 15 to 25 percent found that NO_xNO_x emissions decreased slightly, while particulate matter emissions remained roughly the same. Thus, the current information indicates that an increased use of tires at California's cement kilns would not significantly change co-pollutant emissions based on the limited testing conducted to date. (Emissions Assessment, 2010). Some cement facilities in California have been permitted to combust used tires as fuel, but lingering concerns and controversy about possible emissions likely discourage the widespread acceptance of this practice at this time. Depending on a range of considerations, it may be possible for some covered entities to add used tires to their fuel combinations to reduce GHG emissions.

Switching fuels would be consistent with existing regulations and recognized practices that address transport, handling, use, and disposal of hazardous materials and consequently poses a less than significant environmental impact.

Implement Process Changes

This compliance response entails modifying monitoring, maintenance, and repair procedures at existing industrial, business or commercial facilities, or changing an industrial process in order to reduce emissions. The activities would not be expected to significantly alter the existing use of any hazardous materials that may be in use. In most instances, improved monitoring, maintenance and repair actions would reduce the risk of accidental release and consequent exposure to hazardous materials. As such, this compliance response poses a less than significant impact.

Surrender Compliance Instruments

This compliance response represents the obligation of each covered entity to surrender compliance instruments, i.e. allowances or offset credits equal to their GHG emissions. The transaction of allowances or offset credits would have No Impact related to hazards or hazardous wastes. Design of the cap-and-trade program with and without offsets is evaluated in the Alternatives Analysis section, and the potential environmental effects that could result from offset projects are described in the respective protocol impact analysis sections of this FED.

b. Mitigation

Recognized Measures

Examples of recognized and accepted measures that are routinely required by regulatory agencies to ensure the safe use, handling, transport, and disposition of hazardous materials include:

- Managing hazardous wastes in accordance with established handling and disposal protocols, preparing spill cleanup plans, and providing necessary spill prevention and clean up equipment onsite.
- Documenting the transport and disposition of hazardous materials in transport manifests.
- Diverting hazardous materials that cannot be safely combusted or disposed from the waste stream. Hazardous materials and ash residues from combustion must be directed to landfills or waste disposal sites specifically permitted to accept hazardous wastes.
- Handling individual hazardous materials consistent with BMPs.
- Maintaining safe, secure, and appropriate storage facilities.
- Restricting access to and use of hazardous materials to trained personnel.

- ARB does not have the regulatory authority to require the measures presented above. The ability to require such actions is within the purview of agencies with local permitting authority.

Mitigation

Mitigation is not warranted.

11. Hydrology and Water Quality

This section evaluates potential environmental impacts that could result from implementation of the covered entity compliance responses. The reasonably foreseeable covered entity compliance responses are (1) Upgrade Equipment, (2) Decarbonization, (3) Implement Process Changes, and (4) Surrender Compliance Instruments.

a. Impact Analysis

Implementation of the covered entity compliance responses have the potential to result in a potentially significant impact to hydrology and water quality, flooding, or inundation by seiche, tsunami, or mudflow.

Upgrade Equipment

This compliance response entails upgrading, retrofitting, and/or replacement of aging equipment at existing facilities. Some existing facilities may be located within flood prone areas. Equipment improvements would consist of modifications to existing equipment and/or installation of new equipment at existing facilities. It is possible that incidental new structures, such as ancillary outbuildings, covered shelters, or onsite utility lines might be necessary to accommodate some improvements.

Installation of mechanical equipment within existing structures would not contribute to changes in runoff volume or quality.

Construction of incidental outbuildings or covered shelters would increase onsite impervious surface, potentially reducing infiltration and increasing runoff. During construction, disturbed areas have an increased susceptibility to erosion and consequent sedimentation of local waterways. In most instances, if ancillary buildings are required they would be relatively inconsequential and not of sufficient size to significantly alter the runoff discharge. If existing facilities are located within designated flood zones, the installation of improvements or construction of ancillary structures could increase the value of property susceptible to flooding. Additional structures could obstruct flood flows. Site disturbance could increase erosion and consequent sedimentation of local waterways, or involve placement of structures within a designated flood zone and as such, could represent a potentially significant impact.

Decarbonization

This compliance response entails switching to less carbon intensive fuels. Any equipment modifications required to accommodate new fuels would be accomplished at

existing facilities, primarily within existing structures, and would not be expected to pose a significant adverse impact to hydrology and water quality. However, as described above, construction, grading, trenching for placement of new tanks, fuel storage structures, or other disturbance poses an elevated potential for erosion and consequent sedimentation, representing a potentially significant adverse impact to hydrology and water quality.

Onsite storage of fuel could increase the possibility of leaks or spills potentially resulting in water quality contamination. All existing facilities use fuel and many may store fuel onsite as well. Switching fuels is not expected to significantly change existing onsite use and/or storage of fuel, or as a consequence, the potential for water quality contamination. Replacement of existing, often aged, fuel storage and conveyance equipment with new equipment would generally reduce the potential for mishandling, leaks or spills. This would represent a *beneficial* effect.

Implement Process Changes

This compliance response entails altering monitoring, maintenance, and repair procedures or processes at existing industrial facilities, or altering the manner in which an industrial process is accomplished, to reduce GHG emissions.

Improving monitoring, maintenance, and repair procedures or processes would generally be expected to reduce the potential for leaks or spills from malfunctioning equipment. This would represent a less than significant impact.

Surrender Compliance Instruments

This compliance response represents the obligation of each covered entity to surrender compliance instruments, i.e. allowances or offset credits equal to their GHG emissions. The transaction of allowances or offset credits would have No Impact on hydrology and water quality resources. Design of the cap-and-trade program with and without offsets is evaluated in the Alternatives Analysis section, and the potential environmental effects that could result from offset projects are described in the respective protocol impact analysis sections of this FED.

b. Mitigation

Recognized Measures

The appended Regulatory Framework identifies statutes and regulations that provide regulatory protection of water resources. Additional statutes and regulations may exist. ARB does not have the authority to require implementation of mitigation that could reduce this impact to a less than significant level. The ability to require such measures is under the purview of jurisdictions with local permitting authority. Project-specific impacts and mitigation would be identified during the environmental review by agencies with regulatory authority. Recognized practices that are routinely required to avoid and/or minimize impacts to hydrology and water quality resources include:

- Prepare a hydrologic analysis to ensure project implementation does not result in an unacceptable long-term increase in the volume and/or velocity of storm water discharge.

- Maintain and/or create natural buffers along water courses, construct infiltration basins, detention facilities or other design features to reduce or slow storm water discharge.

- Obtain a National Pollution Discharge Elimination System (NPDES) permit that stipulates discharge quality requirements, routine water quality sampling, and reporting.

- Prohibit construction activities during the winter rainy season with requirements for seasonal weatherization and erosion prevention practices.

- Establish setbacks and prohibit unnecessary grading and disturbance of riparian habitats, drainage channels and streams.

- Require an 'ability to serve' commitment letter from local water agency that establishes the availability of water supply, or conduct appropriate well testing to document the supply capability of groundwater supply.

- Connect to local wastewater treatment systems to minimize inadvertent contamination of local waterways or groundwater by contaminated discharge.

Mitigation

Because the authority to determine project-level impacts and require project-level mitigation lies with the permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant elevated risk of soil erosion and consequent sedimentation of local waterways resulting from site disturbance, grading, and trenching may be unavoidable.

12. Land Use and Planning

This section evaluates potential land use and planning impacts that could result from implementation of the covered entity compliance responses. The reasonably foreseeable covered entity compliance responses are (1) Upgrade Equipment, (2) Decarbonization, (3) Implement Process Changes, and (4) Surrender Compliance Instruments.

The covered entities compliance responses entail improvements to existing facilities, most of which are designated and appropriately zoned. Improvements contemplated by the compliance responses are allowed by such land use designations.

a. Impact Analysis

Upgrade Equipment

This compliance response entails upgrading, retrofitting, and/or replacement of aging equipment at existing facilities. Equipment improvements would consist of modifications to existing equipment and/or installation of new equipment at existing facilities. It is possible that incidental new structures, such as ancillary outbuildings, covered shelters, or onsite utility lines might be necessary to accommodate some improvements.

General Plan land use designations and zoning ordinances vary and a degree of latitude must be acknowledged with respect to determining consistency within different communities. The actions envisioned as compliance responses are generally consistent with business practices and activities normally allowed in industrial, light industrial, business or commercial land uses and are not expected to introduce land use compatibility conflicts.

Some improvements could require a conditional use permit or zoning variance to address site specific issues such as excessive light, dust, or noise from equipment operations. Such site-specific land use issues are not uncommon, and tend to be resolved on a case-by-case basis by specific measures such as limiting hours of operation, fencing or vegetation barriers, or enclosure structures. Potential land use impacts are considered less than significant.

Decarbonization

This compliance response can best be described as switching to less carbon intensive fuels. This action would not conflict with uses typically allowed by conventional industrial, business or commercial land use designations or zoning as described above. Potential land use impacts are considered less than significant.

Implement Process Changes

This compliance response entails altering monitoring, maintenance, and repair procedures at existing industrial, business or commercial facilities, or altering the manner in which an industrial process is accomplished in order to reduce emissions. These actions would not conflict with uses typically allowed by conventional industrial, business or commercial land use designations or zoning as described above. Potential land use impacts are considered less than significant.

Surrender Compliance Instruments

This compliance response represents the obligation of each covered entity to surrender compliance instruments, i.e. allowances or offset credits equal to their GHG emissions. The transaction of allowances or offset credits would have No Impact to land use and planning. Design of the cap-and-trade program with and without offsets is evaluated in

the Alternatives Analysis section, and the potential environmental effects that could result from offset projects are described in the respective protocol impact analysis sections of this FED.

b. Mitigation

Mitigation is not warranted.

13. Noise

This section evaluates potential noise impacts that could result from implementation of the covered entity compliance responses. The reasonably foreseeable covered entity compliance responses are (1) Upgrade Equipment, (2) Decarbonization, (3) Implement Process Changes, and (4) Surrender Compliance Instruments.

a. Impact Analysis

Upgrade Equipment

This compliance response entails upgrading, retrofitting, and/or replacement of aging equipment at existing facilities. Equipment improvements would consist of modifications to existing equipment and/or installation of new equipment at existing facilities. It is possible that incidental new structures, such as ancillary outbuildings, covered shelters, or onsite utility lines might be necessary to accommodate some improvements.

Upgrading, retrofitting, and/or replacement of aging equipment or construction of ancillary structures would produce sounds and noise levels that are consistent with industrial settings. The loudness of construction noise would depend on the type of construction equipment operated and activities ongoing at any given time. Noise produced by construction activities could exceed recognized ambient noise standards onsite or on neighboring properties, but as a result of the short-lived nature of such activities and the routine practice of widely accepted measures to minimize noise impacts, are considered to be less than significant.

Decarbonization

This compliance response can best be described as switching to less carbon intensive fuels. This action would not be expected to generate noise levels that would exceed ambient noise standards. If switching fuels were to require the installation of new fuel tanks, storage structures, or utility lines, resulting construction noise would be consistent with that described in the preceding Upgrade Equipment compliance response. These activities would pose a less than significant impact to the noise environment.

Implement Process Changes

This compliance response entails altering monitoring, maintenance, and repair procedures at existing facilities, or altering the manner in which an industrial process is accomplished. These activities would pose a less than significant impact to the noise environment.

Surrender Compliance Instruments

This compliance response represents the obligation of each covered entity to surrender compliance instruments, i.e. allowances or offset credits equal to their GHG emissions. The transaction of allowances or offset credits would have No Impact on noise levels. Design of the cap-and-trade program with and without offsets is evaluated in the Alternatives Analysis section, and the potential environmental effects that could result from offset projects are described in the respective protocol impact analysis sections of this FED.

b. Mitigation

Recognized Measures

The appended Regulatory Framework identifies statutes and regulations that provide noise exposure guidelines. Additional statutes and regulations may exist. ARB does not have the authority to require implementation of mitigation that could reduce this impact to a less than significant level. The ability to require such measures is under the purview of jurisdictions with local permitting authority. Project-specific impacts and mitigation would be identified during the environmental review by agencies with regulatory authority. Recognized and accepted measures that are routinely required by regulatory agencies or implemented as normal business practice to minimize noise impacts include:

- Comply with local plans, policies, and ordinances regarding acceptable noise and vibration levels.
- Ensure noisy construction activities (including truck deliveries, pile driving and blasting) are limited to the least noise-sensitive times of day (e.g., weekdays during the daytime hours) for projects near sensitive receptors.
- Consider use of noise barriers such as berms and vegetation to limit ambient noise at property lines, especially where sensitive receptors may be present.
- Ensure all project equipment has sound-control devices no less effective than those provided on the original equipment.
- All construction equipment shall be adequately muffled and maintained.
- Consider use of battery powered forklifts and other facility vehicles.
- Ensure all stationary construction equipment (i.e., compressors and generators) is located as far as practicable from nearby sensitive receptors or shielded.
- Properly maintain mufflers, brakes and all loose items on construction and operational-related vehicles to minimize noise and ensure safe operations. Keep truck operations to the quietest operating speeds. Advise about downshifting

and vehicle operations in sensitive communities to keep truck noise to a minimum.

- Use noise controls on standard construction equipment; shield impact tools.
- Consider use of flashing lights instead of audible back-up alarms on mobile equipment.
- Install mufflers on air coolers and exhaust stacks of all diesel and gas-driven engines.
- Equip all emergency pressure relief valves and steam blow-down lines with silencers to limit noise levels.
- Enclose unusually loud machinery or equipment within buildings or other types of effective noise enclosures.

Sounds produced by heavy equipment and construction activities are consistent with industrial settings. These day-to-day activities are accomplished in manner consistent with existing regulations and recognized best practices. Noise reduction measures are implemented as both regulatory and standard industry practice. Expected construction activities would be similar to the existing industrial activities and consequent noise impacts would be less than significant.

Mitigation

Mitigation is not warranted.

14. Employment, Population, and Housing

This section evaluates potential employment, population and housing impacts that could result from implementation of the covered entity compliance responses. The reasonably foreseeable covered entity compliance responses are (1) Upgrade Equipment, (2) Decarbonization, (3) Implement Process Changes, and (4) Surrender Compliance Instruments.

Implementation of the compliance responses would not be expected to significantly increase or decrease direct employment opportunities at the covered entities, but cap-and-trade as a whole would incrementally contribute to the continuing shift to green industries that is largely attributed to RPS, RES, LCFS and AB 32 Scoping Plan measures.

a. Impact Analysis

Upgrade Equipment

This compliance response entails upgrading, retrofitting, and/or replacement of aging equipment at existing facilities. Equipment improvements would consist of modifications to existing equipment and/or installation of new equipment at existing facilities. It is

possible that incidental new structures, such as ancillary outbuildings, covered shelters, or onsite utility lines might be necessary to accommodate some improvements.

The envisioned improvements would be installed by existing employees at the various facilities, or contracted services that specialize in such installations. Similarly, local contractors would likely be retained for the construction of buildings our ancillary structures as needed. None of these actions would be expected to create long-term employment opportunities at facilities, would not increase local population or result in a need for additional housing. Potential impacts are considered less than significant.

Decarbonization

This compliance response can best be described as switching to less carbon intensive fuels. This compliance response would not be expected to create long-term employment opportunities at facilities, would not increase local population or result in a need for additional housing. Potential impacts are considered less than significant.

Implement Process Changes

This compliance response entails altering monitoring, maintenance, and repair procedures at existing industrial, business or commercial facilities, or altering the manner in which an industrial process is accomplished in order to reduce emissions. This compliance response would be expected to create long-term employment opportunities at facilities, would not increase local population or result in a need for additional housing. Potential impacts are considered less than significant.

Surrender Compliance Instruments

This compliance response represents the obligation of each covered entity to surrender compliance instruments, i.e. allowances or offset credits equal to their GHG emissions. The transaction of allowances or offset credits would have No Impact on employment, population or housing. Design of the cap-and-trade program with and without offsets is evaluated in the Alternatives Analysis section, and the potential environmental effects that could result from offset projects are described in the respective protocol impact analysis sections of this FED.

b. Mitigation

Mitigation is not warranted.

15. Public Services

This section evaluates potential impacts to public services that could result from implementation of the covered entity compliance responses. The reasonably foreseeable covered entity compliance responses are (1) Upgrade Equipment, (2) Decarbonization, (3) Implement Process Changes, and (4) Surrender Compliance Instruments.

Public services discussed in this section include law enforcement, fire protection and medical emergency response services, schools, and libraries.

a. Impact Analysis

Upgrade Equipment

This compliance response entails upgrading, retrofitting, and/or replacement of aging equipment at existing facilities. Equipment improvements would consist of modifications to existing equipment and/or installation of new equipment at existing facilities. It is possible that incidental new structures, such as ancillary outbuildings, covered shelters, or onsite utility lines might be necessary to accommodate some improvements.

The envisioned improvements would be installed by existing employees at the various facilities, or by contracted services that specialize in such installations. Similarly, local contractors would likely be retained for the construction of buildings our ancillary structures as needed. With the possible exception of specialized contractors that might be required for some installations, workers would largely be expected to originate from local sources. Additional vehicle trips, such as delivery trucks and worker vehicles, would occur during periods of installation and construction. The possibility of emergency calls for law enforcement, fire protection and/or medical emergency response services would be elevated by increased activity at local facilities. Emergency services are already provided to the facility and the increased possibility of an emergency call during equipment installation or construction would be short-term and incidental. This compliance response would pose less than significant impacts.

Decarbonization

This compliance response can best be described as switching to less carbon intensive fuels. As described above, the possibility of emergency calls for law enforcement, fire protection and/or medical emergency response services would be elevated by increased activity at local facilities. Emergency services are already provided to the facility and the increased possibility of an emergency call during equipment installation or construction would be short-term and incidental. Consequently, this compliance response would pose less than significant impacts.

By definition, fuels are combustible, and depending upon the fuel and volume could pose an increased risk of explosion. This potential impact is mitigated by the extensive range of federal, state and local regulations that address all aspects of fuel use including transportation, handling, storage, use and disposal. As such, this change represents a less than significant impact.

Implement Process Changes

This compliance response entails altering monitoring, maintenance, and repair procedures at existing industrial, business or commercial facilities, or altering the manner in which an industrial process is accomplished in order to reduce emissions. This compliance response would be pose less than significant impacts to public services.

Surrender Compliance Instruments

This compliance response represents the obligation of each covered entity to surrender compliance instruments, i.e. allowances or offset credits equal to their GHG emissions. The transaction of allowances or offset credits would have No Impact on public services. Design of the cap-and-trade program with and without offsets is evaluated in the Alternatives Analysis section, and the potential environmental effects that could result from offset projects are described in the respective protocol impact analysis sections of this FED.

b. Mitigation

Mitigation is not warranted.

16. Recreation

This section evaluates potential impacts to recreation opportunities that could result from implementation of the covered entity compliance responses. The reasonably foreseeable covered entity compliance responses are (1) Upgrade Equipment, (2) Decarbonization, (3) Implement Process Changes, and (4) Surrender Compliance Instruments.

a. Impact Analysis

Upgrade Equipment

This compliance response entails upgrading, retrofitting, and/or replacement of aging equipment at existing facilities. Equipment improvements would consist of modifications to existing equipment and/or installation of new equipment at existing facilities. It is possible that incidental new structures, such as ancillary outbuildings, covered shelters, or onsite utility lines might be necessary to accommodate some improvements. All improvements would occur at existing industrial sites and would have No Impact on recreation facilities or programs.

Decarbonization

This compliance response can best be described as switching to less carbon intensive fuels. All improvements would occur at existing industrial sites and would have No Impact on recreation facilities or programs.

Implement Process Changes

This compliance response entails altering monitoring, maintenance, and repair procedures at existing industrial, business or commercial facilities, or altering the manner in which an industrial process is accomplished in order to reduce emissions. All improvements would occur at existing industrial sites and would have No Impact on recreation facilities or programs.

Surrender Compliance Instruments

This compliance response represents the obligation of each covered entity to surrender compliance instruments, i.e. allowances or offset credits equal to their GHG emissions.

The transaction of allowances or offset credits would have No Impact on recreation facilities or programs. Design of the cap-and-trade program with and without offsets is evaluated in the Alternatives Analysis section, and the potential environmental effects that could result from offset projects are described in the respective protocol impact analysis sections of this FED.

b. Mitigation

Mitigation is not warranted.

17. Transportation and Traffic

This section evaluates potential impacts to transportation traffic that could result from implementation of the covered entity compliance responses. The reasonably foreseeable covered entity compliance responses are (1) Upgrade Equipment, (2) Decarbonization, (3) Implement Process Changes, and (4) Surrender Compliance Instruments.

a. Impact Analysis

Upgrade Equipment

This compliance response entails upgrading, retrofitting, and/or replacement of aging equipment at existing facilities. Equipment improvements would consist of modifications to existing equipment and/or installation of new equipment at existing facilities. It is possible that incidental new structures, such as ancillary outbuildings, covered shelters, or onsite utility lines might be necessary to accommodate some improvements.

This compliance response would require that new equipment and building construction supplies be delivered to existing facilities. Equipment and supplies could be delivered by large trucks, such as semi-trailers, flatbeds, dump trucks and/or concrete trucks. In addition, personnel such as contractors, construction workers, fire safety and building permit inspectors would generate additional vehicle trips to and from the site during equipment installation and construction of ancillary buildings or structures. These vehicle trips would be short-lived, limited to periods of installation and construction, and would not result in long-term change in roadway character or significantly increase the number of annual daily trips (ADT). Existing facilities are located in rural, industrial, light industrial, and similar business zones that are located along transportation corridors or appropriate roads for large trucks and associated business traffic. Consequently, this compliance response represents a less than significant impact.

It is possible that some facilities could be located within airport approach, departure or overflight zones, and the construction or use of structures, equipment, or volatile materials can pose an elevated safety risk in such locations. Facilities located within designated airport safety zones, airport influence areas, or airport referral areas are typically subject to special use permits that limit activities and facility design to minimize risk in proximity to aircraft operations. All compliance responses would be subject to

any use restrictions and/or permit conditions that may be imposed on facilities. As a result, this would be a less than significant impact.

This compliance response would have a less than significant impact to transportation facilities and traffic conditions.

Decarbonization

This compliance response can best be described as switching to less carbon intensive fuels. Existing facilities already use fuel. Coal and similar solid fossil fuels are typically delivered by rail or truck. If facilities are located within a service area, natural gas is delivered by transmission line. Natural gas, propane and similar fuels are typically delivered to rural or remote locations by truck. By definition, fuels are combustible, and depending upon the fuel and volume could pose an increased risk of explosion. Changing fuels could result increase or decrease on road fuel delivery trips. It is not possible to estimate the number of location of such trips. This potential impact is mitigated by the extensive range of federal, state and local regulations that address all aspects of fuel use including transportation, handling, storage, use and disposal. As such, this impact would be less than significant.

Implement Process Changes

This compliance response entails altering monitoring, maintenance, and repair procedures at existing facilities, or altering the manner in which an industrial process is accomplished in order to reduce emissions. This compliance response might increase the frequency of monitoring and maintenance activities that might increase the number of trips to and from facilities. These trips would be considered incidental and pose less than significant impacts to transportation and traffic.

Surrender Compliance Instruments

This compliance response represents the obligation of each covered entity to surrender compliance instruments, i.e. allowances or offset credits equal to their GHG emissions. The transaction of allowances or offset credits would have No Impact on transportation or traffic. Design of the cap-and-trade program with and without offsets is evaluated in the Alternatives Analysis section, and the potential environmental effects that could result from offset projects are described in the respective protocol impact analysis sections of this FED.

b. Mitigation

Mitigation is not warranted.

18. Utilities and Service Systems

This section evaluates potential impacts to utility and service systems could result from implementation of the covered entity compliance responses. The reasonably foreseeable covered entity compliance responses are (1) Upgrade Equipment, (2) Decarbonization, (3) Implement Process Changes, and (4) Surrender Compliance Instruments.

Utility and services discussed in this section include water, wastewater, electricity, natural gas, and solid waste.

a. Impact Analysis

Upgrade Equipment

This compliance response entails upgrading, retrofitting, and/or replacement of aging equipment at existing facilities. Equipment improvements would consist of modifications to existing equipment and/or installation of new equipment at existing facilities. It is possible that incidental new structures, such as ancillary outbuildings, covered shelters, or onsite utility lines might be necessary to accommodate some improvements.

Existing facilities are presumed to have water supply and wastewater treatment. Some facilities are located within the service area of municipal utility districts which provide water supply and wastewater treatment and disposal. Facilities located in remote or rural areas obtain water from local sources including groundwater wells and/or surface sources. Rural facilities often maintain septic disposal where conditions permit. In locations with constrained disposal capacity, facilities may contract for septic storage and offsite disposal service. Upgrading, retrofitting, and/or replacement of aging equipment would pose less than significant impacts to water use or wastewater generation.

Electricity and natural gas are the most commonly used energy sources for domestic uses such as lighting and heating. Facilities located within the service area of utility services likely use both electricity and natural gas provided by utility distribution networks. Some entities likely use greater amounts of natural gas for industrial applications such as boiler operations, kiln or furnace heating. Electricity service is generally available to all but the most remote areas. However, natural gas transmission lines are not as readily available and remote entities often maintain onsite fuel tanks for natural gas or propane which is delivered as needed. In some cases, some covered entities operate cogeneration plants which combust natural gas or other fuel to heat boilers which provide heat and electricity for onsite use. Upgrading, retrofitting, and/or replacement of aging equipment would not be expected to increase the amount of electricity or natural gas used, and in most cases could result in reductions as a result of increase efficiency. Consequently, this would be a less than significant impact.

Solid waste disposal services vary depending upon the type and volume of waste produced at individual locations. Facilities located within municipal service areas may obtain trash pickup and disposal services from the local community. Larger firms, or firms that produce specialized wastes, likely contract services from private trash haulers that deliver to appropriately licensed landfills. Upgrading, retrofitting, or replacement of aging equipment would not be expected to significantly alter the amount of solid waste produced from an existing facility, and would pose a less than significant impact.

As described above, this compliance response would be expected to result in less than significant impacts to water supply, wastewater treatment, electricity, natural gas, and solid waste.

Decarbonization

This compliance response can best be described as switching to less carbon intensive fuels. Switching fuels would not be expected to significantly alter the use and/or generation of domestic water, wastewater or solid waste. This compliance response would be expected to result in less than significant impacts to water supply, wastewater treatment, and solid waste disposal services.

Switching fuels would have the potential to increase the use of electricity and/or natural gas use at some facilities. If any covered entities choose to switch from more carbon intense fuels, such as coal or diesel, to electricity or natural gas, the amount of the electricity or natural gas consumed at that facility would increase. Covered entities would have to contact local utility district(s) and/or private service contractors requesting service, and those entities would provide an availability to serve letter or contractual agreement for the provision of service. If service is unavailable, such guarantee of service would not be provided. As a result, this compliance response would result in less than significant impacts to local utilities or other providers of electricity or natural gas.

Implement Process Changes

This compliance response entails altering monitoring, maintenance, and repair procedures at existing industrial, business or commercial facilities, or altering the manner in which an industrial process is accomplished in order to reduce emissions. This compliance response would result in less than significant impacts to water supply, wastewater treatment, electricity, natural gas, and solid waste.

Surrender Compliance Instruments

This compliance response represents the obligation of each covered entity to surrender compliance instruments, i.e. allowances or offset credits equal to their GHG emissions. The transaction of allowances or offset credits would have No Impact on utility service systems. Design of the cap-and-trade program with and without offsets is evaluated in the Alternatives Analysis section, and the potential environmental effects that could result from offset projects are described in the respective protocol impact analysis sections of this FED.

b. Mitigation

Mitigation is not warranted.

19. Indirect Impacts

For the purposes of this FED, ‘project impacts’ are the environmental consequences that could result from actions implemented by covered entities in order to comply with

the cap-and-trade regulation. CEQA Guidelines §15064(d)(2) defines an indirect impact as …

> "An indirect physical change in the environment is a physical change in the environment which is not immediately related to the project, but which is caused indirectly by the project".

Further, §15064(d)(3) provides the following guidance regarding analysis of indirect impacts …

> "An indirect physical change is to be considered only if that change is a reasonably foreseeable impact which may be caused by the project. A change which is speculative or unlikely to occur is not reasonably foreseeable".

The cap-and-trade regulation would set a limit on statewide GHG emissions from covered entities, but would not stipulate actions required for compliance. Reasonably foreseeable compliance responses are identified and evaluated in this FED. Those actions consist of facility improvements, fuel switching, maintenance, and process changes that are consistent with industrial and business settings. No reasonably foreseeable indirect environmental impacts resulting from those actions have been identified. Further, no other reasonably foreseeable activities resulting from implementation of the cap-and-trade regulation that would pose indirect impacts have been identified.

20. Summary of Impacts and Mitigation Measures

The significance determinations identified below reflect the programmatic nature of the analysis of the reasonably foreseeable methods of compliance with the Cap-and-Trade regulation. Because of this, the FED analysis addresses broadly defined types of impacts without the ability to determine the specific project locations, facility size, character, or site-specific environmental characteristic affected. As a result many impact issues are determined to be potentially significant because of the inherent uncertainties about the relationship between future projects and environmentally sensitive resources or conditions. This is a conservative approach (i.e., tending to overstate environmental impacts), in light of these uncertainties, to satisfy the good-faith, full disclosure purpose of CEQA. When specific projects are proposed and subjected to project-level environmental review, it is expected that many of the impacts identified as potentially significant can be avoided or maintained at a less than significant level.

Another inherent uncertainty in the FED analysis is the degree of implementation of mitigation for potentially significant impacts. While ARB is responsible for adopting the cap-and-trade regulation and implementing the program, it does not have the authority over the proposal, approval or implementation of project or location-specific actions or offset projects. Additionally, state and /or federal permits are needed for specific

environmental resource impacts, such as take of endangered species, filling of wetlands, and streambed alteration.

Because ARB is not responsible for and does not have the authority to require implementation of project-specific mitigation and the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable.

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a. Summary Impact Matrix for Covered Entities Compliance Responses

Covered Entity Compliance Response	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Aesthetics			
1. Upgrade Equipment	Less than Significant	Mitigation is not warranted	Less than Significant
2. Decarbonization	Less than Significant	Mitigation is not warranted	Less than Significant
3. Implement Process Changes	Less than Significant	Mitigation is not warranted	Less than Significant
4. Surrender Compliance Instruments.	No Impact	Mitigation is not warranted	No Impact
Agricultural and Forest Resources			
1. Upgrade Equipment	Less than Significant	Mitigation is not warranted	Less than Significant
2. Decarbonization	Less than Significant	Mitigation is not warranted	Less than Significant
3. Implement Process Changes	Less than Significant	Mitigation is not warranted	Less than Significant
4. Surrender Compliance Instruments.	No Impact	Mitigation is not warranted	No Impact
Air Quality			
1. Upgrade Equipment			
Upgrading equipment will reduce long-term emissions including GHG, criteria pollutants and toxic emissions.	Beneficial	Mitigation is not warranted	Beneficial
Construction, grading, trenching, and general site disturbance for new structures could increase onsite emissions from the operation of heavy equipment and fugitive dust from grading and ground disturbance.	Potentially Significant	Recognized practices that are routinely required to avoid and/or minimize impacts to biological resources include: • Mandatory compliance with the Federal Clean Air Act and California Air Quality Regulations. Projects are subject to NSR and BACT criteria. • Mandatory permitting, monitoring, and reporting ensure that emission control equipment is	Significant and Unavoidable

Covered Entity Compliance Response	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
		properly maintained. • Restriction of construction during windy periods. • Site design to limit grading, restriction of construction activities during windy conditions, and the use of watering trucks can minimize dust (particulate) generation during site development or other construction activities. • Properly maintain construction equipment and emission control devices. • Idling of heavy construction and diesel equipment should be minimized. • Extension of electrical service to construction sites rather than reliance on ICE generators to provide electricity.	
2. Decarbonization			
Switching to fuels that are less carbon intensive will reduce emissions.	Beneficial	Mitigation is not warranted	Beneficial
Construction, grading, trenching, and general site disturbance for fuel tanks, storage structures, and lines could adversely impact could increase emissions from the operation of heavy equipment and fugitive dust.	Potentially Significant	Refer to construction mitigation under “Upgrade Equipment” compliance response above.	Significant and Unavoidable
3. Implement Process Changes:			
Improved operation, maintenance, and process changes would reduce overall emissions.	Beneficial	Mitigation is not warranted	Beneficial
Although unlikely, increased operation of individual pieces of equipment could result in a localized air quality impact at facilities.	Potentially Significant	ARB employs an Adaptive Management approach to address unanticipated impacts and to review and revise policies, protocols, and procedures as more information becomes available. Refer to the Project Description for a more detailed description of this	Significant and Unavoidable

Covered Entity Compliance Response	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
		process.	
4. Surrender Compliance Instruments.	No Impact	Mitigation is not warranted	No Impact
Biological Resources			
1. Upgrade Equipment Construction, grading, trenching, and general site disturbance for new structures could impact biological resources.	Potentially Significant	Mitigation is warranted. Examples of recognized and accepted measures that are routinely required by regulatory agencies or implemented as normal business practices: • Preparation of a biological inventory of site resources by a qualified biologist prior to ground disturbance or construction. If protected species or their habitats are present, comply with applicable endangered species acts and regulations. Ensure that important fish or wildlife movement corridors or nursery sites are not impeded by project activities. • Preparation of a wetland survey of onsite resources. Establish setbacks and prohibit disturbance of riparian habitats, streams, intermittent and ephemeral drainages, and other wetlands. • Prohibit construction activities in the vicinity of raptor nests during nesting season or establish protective buffers and provide monitoring as needed to ensure that project activity does not cause an active nest to fail. • Preparation of site design and development plans that avoid or minimize disturbance of habitat and wildlife resources, and prevents storm water discharge that could contribute to sedimentation and degradation of local waterways.	Significant and Unavoidable
2. Decarbonization			

Covered Entity Compliance Response	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Construction, grading, trenching, and general site disturbance for fuel tanks, storage structures, and lines could adversely impact biological resources.	Potentially Significant	See mitigation above	Significant and Unavoidable
3. Implement Process Changes	Less than Significant	Mitigation is not warranted	Less than Significant
4. Surrender Compliance Instruments.	No Impact	Mitigation is not warranted	No Impact
Cultural Resources			
1. Upgrade Equipment Construction, grading, trenching, and general site disturbance for new structures could adversely impact cultural resources.	Potentially Significant	Mitigation is warranted. Examples of recognized and accepted measures that are routinely required by regulatory agencies or implemented as normal business practices: • A cultural resources site survey shall be performed by a qualified archaeologist or cultural specialist that conforms to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61 (36 CFR Part 61). • The State Historic Preservation Officer and federal lead agencies shall be contacted as appropriate for coordination of Nation-to-Nation consultations with the Native American Tribes. • A qualified paleontological resources specialist shall be consulted to determine whether paleontological resources would likely be disturbed in a project area on the basis of the sedimentary context of the area and a records search for past paleontological finds in the area. The assessment may suggest areas of high known potential for containing resources. If the assessment is inconclusive a surface survey is recommended to determine the fossilferous potential and extent of the pertinent sedimentary	Significant and Unavoidable

Covered Entity Compliance Response	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
		units within the project site. If the site contains areas of high potential for significant paleontological resources and avoidance is not possible, prepare a paleontological resources management and mitigation plan.	
2. Decarbonization Construction, grading, trenching, and general site disturbance for fuel tanks, storage structures, and lines could adversely impact cultural resources.	Potentially Significant	See mitigation above	Significant and Unavoidable
3. Implement Process Changes	Less than Significant	Mitigation is not warranted	Less than Significant
4. Surrender Compliance Instruments.	No Impact	Mitigation is not warranted	No Impact
Energy Demand			
1. Upgrade Equipment	Beneficial Impact	Mitigation is not warranted	Beneficial Impact
2. Decarbonization	Beneficial Impact	Mitigation is not warranted	Beneficial Impact
3. Implement Process Changes	Beneficial Impact	Mitigation is not warranted	Beneficial Impact
4. Surrender Compliance Instruments.	No Impact	Mitigation is not warranted	No Impact
Geology, Soils, and Minerals			
1. Upgrade Equipment Construction, grading, trenching, and general site disturbance for new structures could result in increased erosion and consequent sedimentation of local waterways.	Potentially Significant	Mitigation is warranted. Examples of recognized and accepted measures that are routinely required by regulatory agencies or implemented as normal business practices: • Prepare a grading plan accompanied by an erosion and sediment control plan. • Complete geotechnical and engineering analyses prior to construction of buildings or structures.	Significant and Unavoidable

Covered Entity Compliance Response	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
		• Design and construct structures consistent with Uniform Building Code specifications, including conformance with requirements that address local seismic conditions. • Avoid placement of structures on steep slopes, alluvial fans, and other areas prone to landslides or flash floods, or with gullies or washes. • Limit construction activities during wet weather and the winter season. If work cannot be completed before winter, disturbed areas shall be winterized to minimize erosion. • Implement BMPs to minimize erosion and sedimentation including use of filter berms, sandbag or straw bale barriers, siltation retention fences, vegetated buffer strips, vegetated swales, and spill containment provisions • Provide prompt restoration and revegetation of disturbed areas following completion of construction.	
2. Decarbonization Construction, grading, trenching, and general site disturbance for fuel tanks, storage structures, and lines could adversely impact cultural resources.	Potentially Significant	See mitigation above	Significant and Unavoidable
3. Implement Process Changes	Less than Significant	Mitigation is not warranted	Less than Significant
4. Surrender Compliance Instruments	No Impact	Mitigation is not warranted	No Impact
Greenhouse Gases			
1. Upgrade Equipment	Less than Significant	Mitigation is not warranted	Less than Significant
2. Decarbonization	Less than Significant	Mitigation is not warranted	Less than Significant

Covered Entity Compliance Response	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
3. Implement Process Changes	Less than Significant	Mitigation is not warranted	Less than Significant
4. Surrender Compliance Instruments.	No Impact	Mitigation is not warranted	No Impact
Hazards and Hazardous Materials			
1. Upgrade Equipment	Less than Significant	Mitigation is not warranted	Less than Significant
2. Decarbonization	Less than Significant	Mitigation is not warranted	Less than Significant
3. Implement Process Changes	Beneficial Impact	Mitigation is not warranted	Beneficial Impact
4. Surrender Compliance Instruments.	No Impact	Mitigation is not warranted	No Impact
Hydrology, Water Quality and Water Supply			
1. Upgrade Equipment Construction, grading, trenching and general site disturbance for new structures could result in increased erosion and consequent sedimentation of local waterways.	Potentially Significant	Mitigation is warranted. Examples of recognized and accepted measures that are routinely required by regulatory agencies or implemented as normal business practices: • Prepare a hydrologic analysis to ensure project implementation does not result in an unacceptable long-term increase in the volume and/or velocity of storm water discharge. • Maintain and/or create natural buffers along water courses, construct infiltration basins, detention facilities or other design features to reduce or slow storm water discharge. • Obtain a National Pollution Discharge Elimination System (NPDES) permit that stipulates discharge quality requirements, routine water quality sampling, and reporting. • Prohibit construction activities during the winter rainy season with requirements for seasonal weatherization and erosion prevention practices.	Significant and Unavoidable

Covered Entity Compliance Response	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
		• Establish setbacks and prohibit unnecessary grading and disturbance of riparian habitats, drainage channels and streams. • Require an 'ability to serve' commitment letter from local water agency that establishes the availability of water supply, or conduct appropriate well testing to document the supply capability of groundwater supply. • Connect to local wastewater treatment systems to minimize inadvertent contamination of local waterways or groundwater by contaminated discharge.	
2. Decarbonization Construction, grading, trenching, and general site disturbance for fuel tanks, storage structures, and lines could adversely impact cultural resources.	Potentially Significant	See mitigation above	Significant and Unavoidable
3. Implement Process Changes	Less than Significant	Mitigation is not warranted	Less than Significant
4. Surrender Compliance Instruments	No Impact	Mitigation is not warranted	No Impact
Land Use			
1. Upgrade Equipment	Less than Significant	Mitigation is not warranted	Less than Significant
2. Decarbonization	Less than Significant	Mitigation is not warranted	Less than Significant
3. Implement Process Changes	Less than Significant	Mitigation is not warranted	Less than Significant
4. Surrender Compliance Instruments.	No Impact	Mitigation is not warranted	No Impact

Covered Entity Compliance Response	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Noise			
1. Upgrade Equipment	Less than Significant	Mitigation is not warranted	Less than Significant
2. Decarbonization	Less than Significant	Mitigation is not warranted	Less than Significant
3. Implement Process Changes	Less than Significant	Mitigation is not warranted	Less than Significant
4. Surrender Compliance Instruments.	No Impact	Mitigation is not warranted	No Impact
Employment, Population, and Housing			
1. Upgrade Equipment	Less than Significant	Mitigation is not warranted	Less than Significant
2. Decarbonization	Less than Significant	Mitigation is not warranted	Less than Significant
3. Implement Process Changes	Less than Significant	Mitigation is not warranted	Less than Significant
4. Surrender Compliance Instruments.	No Impact	Mitigation is not warranted	No Impact
Public Services			
1. Upgrade Equipment	Less than Significant	Mitigation is not warranted	Less than Significant
2. Decarbonization	Less than Significant	Mitigation is not warranted	Less than Significant
3. Implement Process Changes	Less than Significant	Mitigation is not warranted	Less than Significant
4. Surrender Compliance Instruments.	No Impact	Mitigation is not warranted	No Impact
Recreation			
1. Upgrade Equipment	Less than Significant	Mitigation is not warranted	Less than Significant
2. Decarbonization	Less than Significant	Mitigation is not warranted	Less than Significant
3. Implement Process Changes	Less than Significant	Mitigation is not warranted	Less than Significant
4. Surrender Compliance Instruments.	No Impact	Mitigation is not warranted	No Impact

Covered Entity Compliance Response	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Transportation and Traffic			
1. Upgrade Equipment	Less than Significant	Mitigation is not warranted	Less than Significant
2. Decarbonization	Less than Significant	Mitigation is not warranted	Less than Significant
3. Implement Process Changes	Less than Significant	Mitigation is not warranted	Less than Significant
4. Surrender Compliance Instruments.	No Impact	Mitigation is not warranted	No Impact
UTILITIES AND SERVICE SYSTEMS			
1. Upgrade Equipment	Less than Significant	Mitigation is not warranted	Less than Significant
2. Decarbonization	Less than Significant	Mitigation is not warranted	Less than Significant
3. Implement Process Changes	Less than Significant	Mitigation is not warranted	Less than Significant
4. Surrender Compliance Instruments.	No Impact	Mitigation is not warranted	No Impact

C. Compliance Offset Protocol for U.S. Ozone Depleting Substances Projects

1. Protocol Description and Compliance Responses

a. Ozone Depleting Substances Offset Protocol Description

Basic processes

Ozone depleting substances (ODS) refer to a large group of chemicals known to destroy the stratospheric ozone layer when released into the atmosphere; they also have high GWP ranging from several hundred to over ten thousand times that of CO_2 (IPCC 2007). ODS have historically been used in a wide variety of applications including refrigerants, foam blowing agents, solvents, and fire suppressants. The types of ODS eligible under the ODS Offset Protocol consist of the following:

- Refrigerants (used for industrial/commercial refrigeration, cold storage, air conditioners.)
    - Eligible refrigerants: CFC-11, CFC-12, CFC-114, and CFC-115
- Foam blowing agents (used as insulation in refrigerators, buildings, air conditioners, and other appliances)
    - Eligible foam blowing agents: CFC-11, CFC-12, HCFC-141b, and HCFC-22

The U.S., in compliance with the Montreal Protocol, is phasing-out the production and importation of ODS. The eligible gases under this offset protocol have been phased out of production and importation in the U.S. for those uses. CFCs were phased-out in 1996 and the HCFCs were phased-out for foam use at the beginning of 2010. Although the eligible gases can no longer be produced or imported, the current supply of these substances may continue to be recovered, recycled, reclaimed, and reused. In addition, there are no regulations that require the recovery and proper destruction of these substances to prevent the release of ODS to the atmosphere at the end of their life cycle. For foams, these materials are shredded and disposed at landfills, where a portion would leak to the atmosphere. Refrigerants are expected to be recycled and emitted through leakage from equipment.

Under the ODS Offset Protocol, offset credits would be issued for destruction of ODS at an eligible destruction facility in the U.S. (i.e., a facility that has received a permit for the destruction of ODS, or meets United Nations guidelines). Destruction outside the U.S. would not be accepted for credit under this offset protocol. All ODS eligible for offset credits must originate in banks (i.e., ODS in equipment and material) currently residing within the U.S. Eligible refrigerant ODS could be collected from industrial, commercial, or residential equipment, systems, appliances or stockpiles. Eligible foam ODS could either be extracted from appliance foams and destroyed in a concentrated form or

destroyed as intact foam source from building insulation. Concentrated foam blowing agent ODS would be extracted under negative pressure and then collected, stored, and transported in cylinders or other hermetically sealed containers. Likewise, intact foam separated from building panels would be stored, transported, and destroyed in sealed containers. Further, all destruction activities would be conducted in accordance with the CAA and the CCAA and would achieve 98 percent destruction efficiency (DE).

ODS Destruction Facilities

ODS offset projects implemented under the ODS Offset Protocol would occur at locations in the U.S. at any of five existing commercial incineration facilities with a RCRA permit or a non-RCRA facility that meets standards established by the United Nations Environment Programme's Technology and Economic Assessment Panel (TEAP). There are no commercial ODS destruction facilities in California. Five facilities in the U.S. with RCRA permits offer destruction of ODS through incineration. These five facilities are in the following locations:

- Clean Harbors Environmental Services Inc., Arkansas
- Clean Harbors Environmental Services Inc., Texas
- Clean Harbors Environmental Services Inc., Utah
- Veolia ES Technical Solutions LLC, Illinois
- Veolia ES Technical Solutions LLC, Texas

The one non-RCRA permitted facility that is currently destroying ODS and meets the TEAP requirements is:

- RemTec International, Ohio

The existing ODS incineration facilities currently are operating at approximately 70 percent capacity and should possess sufficient capacity to accept ODS from the existing banks (ICF 2008). ODS would; therefore, be transported from their current locations to an existing destruction facilities. It is estimated that the current total volume of banked, eligible ODS would be destroyed within an approximately 5-year period after initiation.

b. Ozone Depleting Substances Offset Protocol Compliance Responses

Under the ODS Offset Protocol, it is expected that the following compliance responses would be reasonably foreseeable.

- Available capacity at existing U.S. ODS destruction facilities would be utilized. Adequate capacity exists at the six existing ODS destruction facilities to handle ODS destruction pursuant to this offset protocol.

- Transport of ODS to the ODS destruction facilities would occur, resulting in transportation emissions. ODS transport may occur by truck, rail, waterborne craft, or aircraft.

- Incineration is an existing technology for destruction, so emissions from combustion would occur, potentially including TACs and PM. In addition, a small fraction of ODS would be emitted due to incomplete destruction. ODS incinerators are generally required to include substantial pollution controls as part of the permitting process. Any non-incineration technologies would meet TEAP guidelines on emissions, which are in-line with RCRA standards. With the destruction of ODS refrigerants, there would be increased use of corresponding substitute refrigerants.

- With the extraction of foam blowing agents and the destruction of intact ODS-containing foams, there would be decreased quantities of ODS released from appliance and foam shredding, and foam landfilling.

Under the ODS Offset Protocol, no new ODS destruction facilities would be constructed due to the high cost of developing such facilities, stringent permitting requirements, and the limited supply of ODS that would qualify for destruction (e.g., expected to be exhaustible within approximately 5 years of program initiation). ODS offset projects implemented under the ODS Offset Protocol would utilize any of the five existing incinerators with a RCRA permit or the non-RCRA facility that meets the standards established by TEAP. Sufficient capacity has been identified at the five RCRA-permitted ODS incinerators able to accept ODS materials generated by the adoption of this offset protocol. No new or expanded facilities would be required. The inclusion of non-RCRA facilities that meet TEAP standards would increase available destruction capacity and would not be expected to result in any significant impact differences compared to an impact analysis of RCRA-permitted facilities only.

c. Protocol Impacts and Mitigation

The impacts of implementing the ODS Offset Protocol on each environmental resource area are described below

2. Aesthetics

a. Scenic Vistas, Scenic Resources, Visual Character, Light and Glare

Under this offset protocol, offset credits would be issued for destruction of ODS at an eligible destruction facility in the U.S. Transport of ODS to the destruction facilities would occur on existing roads. Because this offset protocol would involve only existing facilities and no new facilities would be constructed, no impact to scenic resources would occur.

b. Protocol Mitigation

Mitigation is not warranted.

3. Agriculture and Forest Resources

a. Conversion of Farmland to Non-Farmland Uses, Conflicts with Existing Zoning, Conflicts with Williamson Act Contracts

Because the destruction of ODS would use capacity in existing facilities and no new facilities would be constructed, this offset protocol would not result in the conversion of agricultural land for non-agricultural uses or conflicts with existing zoning or Williamson Act contracts Therefore, implementation of the ODS Offset Protocol would have less than significant impacts on agricultural and forest resources.

b. Conflict with Forest Land or Timberland Zoning, Loss or Conversion of Forest Land to Non-Forest Uses

Because the destruction of ODS would use capacity in existing facilities and no new facilities would be constructed, this offset protocol would not conflict with existing zoning for forest land, timberland, or timber production zone or result in conversion of forest to nonforest land or loss of forest land. Therefore, implementation of the ODS Offset Protocol would have less than significant impacts on forest resources.

c. Protocol Mitigation

Mitigation is not warranted.

4. Air Quality

a. Conflicts with Adopted Air Quality Plan, Violate Air Quality Standards, Cumulatively Significant Increases in Criteria Pollutants

Short-Term Construction Impacts

No new or expanded facilities would be required. Short-term construction-related air quality impacts of this offset protocol would; therefore, not occur.

Operational Activities

The locations of the five existing ODS destruction facilities with RCRA permits and one non-RCRA facility that meets TEAP standards, as well as their respective federal AAQS attainment designation, are presented in Table 4C-1.

For each of the nonattainment areas shown in Table 4C-1, air quality attainment plans exist and each of these ODS destruction facilities have an operating permit that is accounted for in the respective attainment plans. These operating permits contain various specific conditions, including emission limits, operating hour limits, mandatory emission controls, and/or required operating practices. In general, current operating levels at these ODS destruction facilities are required to be within permit limits. If there is available operating capacity with the existing permit limits, then the ODS destruction

facility would continue compliance with the permit requirements. If a ODS destruction facility is currently operating at its existing permit limits, then it would not accept ODS for destruction at that time. Instead, ODS destruction at the facility could be delayed to a later date, if permit capacity would become available within a reasonable time, or it would be redirected to another ODS destruction facility with available operating capacity under its own permit limits. The U.S. EPA estimates that ODS destruction facilities are operating at only about 70 percent of total capacity (U.S. EPA 2008; pg 21).

Table 4C-1
ODS Destruction Facility Locations and Attainment Designations

Facility Name	Location	Designation	Nonattainment Area Name
Clean Harbors Environmental Services Inc.	El Dorado (Union County), AR	Attainment	-
Veolia ES Technical Solutions LLC	Sauget (St. Clair County), IL	8-hour moderate ozone nonattainment, $PM_{2.5}$ nonattainment	St. Louis MO-IL Nonattainment Area
Clean Harbors Environmental Services Inc	La Porte (Harris County), TX	8-hour severe ozone nonattainment	Houston-Galveston-Brazoria Nonattainment Area
Veolia ES Technical Solutions LLC	Port Arthur (Jefferson County), TX	8-hour moderate ozone nonattainment	Beaumont-Port Arthur Nonattainment Area
Clean Harbors Environmental Services Inc.	Aragonite (Tooele County), UT	primary and secondary SO_2 nonattainment	Tooele County UT Nonattainment Area
RemTec International	Bowling Green (Wood County), OH	Attainment	-

Source: ERG 2010.

Implementation of the ODS Offset Protocol would require, as part of long-term operations, transportation of ODS to existing destruction facilities, and would result in associated mobile-source emissions of criteria air pollutants and precursors and TACs (e.g., diesel PM). Transportation of ODS to destruction facilities may occur by truck, rail, waterborne craft, or aircraft.

Recovery of ODS from refrigeration equipment and foam sources would involve collection at centralized facility locations. Transport of ODS from recovery facility to destruction facility would generally occur when full cargo loads are collected. This offset protocol assumes that a large batch of ODS would travel approximately 2,000 miles. Thus, it is not anticipated that a substantial increase in truck trips would be added to roadways.

In addition, incineration of CFCs and HCFCs would result in emissions of hydrofluoric acid, HCl, Cl_2, organic acids, products of incomplete combustion (PICs), dioxins, and furans. These compounds are classified as TACs (i.e., hazards air pollutants in the

federal parlance). ODS destruction facilities also have operating permits for TACs that contain emission limits, operating limits, emission control requirements, and operating practices to ensure that TAC emissions are within permit limits. As described above for criteria pollutants, if there is available operating capacity with the existing permit limits, then the facility would continue compliance with the permit requirements. If a facility is currently operating at its existing permit limits, then it would not accept ODS for destruction at that time. Instead, ODS destruction at the facility could be delayed to a later date, if permit capacity would become available within a reasonable time, or it would be redirected to an ODS destruction facility with available operating capacity under its own permit limits. As stated above, the U.S. EPA estimates that ODS destruction facilities are operating at only about 70 percent of total capacity (U.S. EPA 2008; pg 21).

Because ODS destruction facilities would continue to operate within permit limits, it is not anticipated that implementation of the ODS Offset Protocol would contribute to a violation of an AAQS, expose sensitive receptors to excessive pollutant concentrations, or expose people to objectionable odors. In addition, increases in mobile-source emissions (i.e., criteria pollutants and TACs) from the methods used to collect and transport ODS banks to destruction facilities would not be anticipated to be substantial. Thus, implementation of the ODS Offset Protocol would have less than significant impacts on air quality.

b. Odors

Depending on current operations, these existing destruction facilities could emit odors; however, ODS offset projects implemented under the ODS Offset Protocol would not be anticipated to increase odors due to the type of materials that would be destroyed. In addition, because no new ODS destruction facilities would be constructed and destruction would occur at existing facilities, no new locations of odors in regards to the locations of existing receptors would occur. As a result, implementation of the ODS Offset Protocol would not be anticipated to result in the exposure of sensitive receptors to objectionable odors. This impact would be less than significant.

c. Protocol Mitigation

Mitigation is not warranted.

5. Biological Resources

a. Special-Status Species and Habitat Impacts, Impacts on Wetlands, Interfere with Movement of Native or Migratory Fish, or Local Biological Protection or Habitat Conservation Plans

Under this offset protocol, offset credits would be issued for destruction of ODS at an eligible destruction facility in the U.S. Transport of ODS to the destruction facilities would occur on existing roads. Thus, this offset protocol would not be expected to result in substantial impacts to special-status species, riparian or other sensitive

habitats, wetlands or other waters of the U.S.; interfere substantially with native wildlife or fish movement or use of nursery sites; or conflict with local plans or policies protecting biological resources or approved HCP, NCCP, or other habitat conservation plans. Therefore, impacts to biological resources from implementation of the ODS Offset Protocol would be less than significant.

b. Protocol Mitigation

Mitigation is not warranted.

6. Cultural Resources

a. Impacts to Archaeological Resources, Historic Resources, Paleontological Resources, or Undocumented Human Remains

There would be no construction of new ODS destruction facilities and destruction at existing facilities would not affect cultural resources in the U.S. because no facility expansion would occur. Therefore, there would be no impacts to cultural resources from implementation of the ODS Offset Protocol.

b. Protocol Mitigation

Mitigation is not warranted.

7. Energy Demand

a. Impacts to Energy Resources

Because the ODS Offset Protocol would use capacity in existing facilities, implementation thereof would not be expected to result in any substantial changes in energy demands such that it would conflict with adopted energy conservation plans, result in the need for new or expanded electricity or natural gas facilities, or create any significant effects on peak and base period demands for electricity and other forms of energy. Implementation of the ODS Offset Protocol would not result in any changes to existing operations and; therefore, would comply with adopted energy standards. This would be a less than significant impact.

b. Protocol Mitigation

Mitigation is not warranted.

8. Geology, Soils, and Minerals

a. Seismic Impacts, Unstable Soils Impacts, Expansive Soils Impacts, and Impacts to Mineral Resources

It is assumed that the existing destruction facilities were sited in a manner that appropriately considered and mitigated for any potential geology, soils, or mineral resources impact and were designed in accordance with appropriate state and/or federal building standards (e.g., UBC), which would address seismic and other soil

stability concerns. Therefore, implementation of the ODS Offset Protocol would not result in impacts to geology, soils, and mineral resources.

b. Protocol Mitigation

Mitigation is not warranted.

9. Greenhouse Gases

a. Generate Significant Greenhouse Gas Emissions or Conflict with Applicable Greenhouse Gas Plan

Implementation of the ODS Offset Protocol would require transportation of ODS to existing ODS destruction facilities, and would result in associated mobile-source GHG emissions. In addition, destruction of ODS would lead to increase production and demand for ODS substitutes. The ODS Offset Protocol, includes default calculations for GHG emissions associated with transportation and destruction of ODS using conservative assumptions, ranging from 7.5 to 75 MT CO_2e per MT of ODS destroyed. GWP of ODS range from 725 to 10,900. Therefore, the reduction of GHGs due to the destruction of ODS would be 100-10,000 times the emissions generated (e.g., from transportation) associated with the ODS offset projects implemented under this offset protocol. ODS substitutes would result in GHG emissions, but to a much lesser extent than the ODS that would be destroyed. Nevertheless, implementation of the ODS Offset Protocol would result in an overall net reduction in GHG emissions, and associated beneficial impact on climate change.

b. Protocol Mitigation

Mitigation is not warranted.

10. Hazards and Hazardous Materials

a. Impacts Related to the Routine Disposal and Transport of Hazardous Materials, Impacts Related to the Release of Hazardous Materials to the Environment or Near Schools, Impacts Related to Creating a Significant Hazard to the Public or the Environment, and Impacts Related to Creation of Hazards Near Airports

Some ODS are considered hazardous materials and are; therefore, regulated by federal, state, and/or local regulatory agencies. This offset protocol would not remove or otherwise change the effectiveness of these regulations and the use, storage, and transfer of ODS would continue to occur in compliance with these regulations. Similarly, the existing ODS destruction facilities are currently permitted and regulated for such uses. The ODS Offset Protocol would not change how materials are handled or destroyed. Therefore, implementation of this offset protocol would not result in a new or substantially more severe hazardous material impacts related to the use, storage, transport of hazardous materials; accidental spills; hazardous emissions near schools,

airports or other sensitive receptors; or operations on designated hazardous materials sites. Therefore, this would be a less than significant impact.

b. Impacts Related to Creating Conflicts with Emergency Response Plan or Exposure of People to Increased Wildland Fire Risks

Because existing ODS destruction facilities are permitted and were likely sited in locations that are compatible with associated operations (e.g., incineration), implementation of the ODS Offset Protocol would not result in any conflicts with adopted emergency response plans and would not increase the risks of wildland fires. Therefore, this would be a less than significant impact.

c. Protocol Mitigation

Mitigation is not warranted.

11. Hydrology and Water Quality

a. Impacts Related to Violation of Existing Water Quality Standards and Waste Discharge Requirements, Depletion of Groundwater, Alteration of Existing Drainage, Degradation of Water Quality, and Exceedance of the Capacity of Existing Stormwater Systems

Because destruction of ODS would occur within the capacity of existing facilities, implementation of the ODS Offset Protocol would not be expected to violate water quality standards, change the course or direction of any river or stream, or reduce the area of recharge. Further, implementation of ODS offset projects under this offset protocol would not change flood zones or otherwise impact regional hydrology. Implementation of the ODS Offset Protocol would have no effect on water quality, as ODS currently removed by destruction (i.e., incineration) or landfilling are largely volatile materials that occur in air and do not tend to concentrate in waters. ODS destruction facilities are regulated to minimize the materials that exit the air stacks and would not be expected to contribute to stormwater pollution. Therefore, this would be a less than significant impact.

b. Impacts Related to Placement of Housing in a 100-year Flood Hazard Area, Redirecting Flood Flows, Exposure of People to Flooding from Levee or Dam Failure, or Inundation by Seiche, Tsunami, or Mudflow

Implementation of the ODS Offset Protocol would not result in the construction of new housing; therefore, no impacts would occur related to placement of housing in a 100-year flood hazard area.

Further, no new structures would be constructed as a result of ODS offset projects implemented under this offset protocol; therefore, the ODS Offset Protocol would not introduce features that would impede or redirect flood flows and trees would not be placed in areas that would increase the exposure of people to impacts related to the

failure of a dam or levee, seiche, tsunami, or mudflow. Therefore, no impact would occur.

c. Protocol Mitigation

Mitigation is not warranted.

12. Land Use and Planning

a. Impacts Related to Conflicts with Relevant Plans or Policies, Impacts Related to Division of an Established Community

Because the destruction of ODS would occur within the capacity of existing facilities, this offset protocol would not physically divide an existing community, result in land use conflicts, including habitat conservation plans or natural community conservation plans, or result in the conversion of agriculture for non-agricultural uses. Therefore, implementation of the ODS Offset Protocol would have less than significant impacts on land use and planning.

b. Protocol Mitigation

Mitigation is not warranted.

13. Noise

a. Impacts Related to Generation of Noise in Excess of Applicable Standards, Exposure of Sensitive Receptors to Excessive Groundborne Vibration, and Substantial Increases in Ambient Noise Levels

ODS offset projects implemented under the ODS Offset Protocol would utilize existing ODS destruction facilities located in the U.S. Sufficient capacity exists at these ODS destruction facilities to accept ODS. No new or expanded facilities would be required. Thus, implementation of this offset protocol would not generate short-term construction noise (or vibration) levels in excess of applicable standards or that result in a substantial increase in ambient levels at nearby sensitive receptors. As a result, this impact would be less than significant.

Implementation of a project under the ODS Offset Protocol would involve recovery of ODS from refrigeration equipment and foam sources including collection at centralized facility locations and transportation of ODS to existing ODS destruction facilities. Transportation of ODS may occur at increased rates compared to existing conditions. These transportation activities could occur by rail, waterborne craft, or aircraft, but would primarily occur by trucks, which would consequently increase traffic source noise levels. The exact number of daily trips required for such operations or the location of affected roadway segments is not known at this time. In general, when the average daily traffic (ADT) volume is doubled on a roadway segment in comparison to existing conditions, the resultant increase is approximately 3 dB CNEL/L_{dn}, which is typically

considered substantial as a change of this magnitude is perceivable to the human ear. ADT volumes on roadway segments in the project area vary considerable (e.g., from hundreds to hundreds of thousands) under existing no project conditions. However, transport of ODS from recovery facilities to destruction facilities would be anticipated to only occur when the collection of a full cargo load is achieved and, thus, would not be expected to result in frequent truck trips such that ADT volumes on affected roadway segments would be doubled. In regards to stationary source noise, as stated above, no new or expanded facilities would be required. Thus, implementation of the ODS Offset Protocol would not generate long-term operational noise (or vibration) levels in excess of applicable standards or that result in a substantial increase in ambient levels at nearby sensitive receptors. As a result, this impact would be less than significant.

b. Impacts Related to Exposure of People Residing or Working in the Area to Excessive Airport-Related Noise Levels

Because this offset protocol would not require any new land use types for which people would reside, any new locations where people would work, or any new airport locations or a substantial increase in airport-activities, implementation thereof would not expose people residing or working in the project area to excessive airport-related noise levels. As a result, this impact would be less than significant.

c. Protocol Mitigation

Mitigation is not warranted.

14. Employment, Population, and Housing

a. Impacts Related to Displacement of Housing or People and Substantial Inducement of Population Growth

No new or expanded ODS destruction facilities would be constructed and; therefore, no new employment opportunities would be created. Because ODS destruction activities that would occur under the protocol would utilize existing ODS destruction facilities, implementation of the ODS Offset Protocol would result in less than significant impacts related to population, employment, and housing supplies.

b. Protocol Mitigation

Mitigation is not warranted.

15. Public Services

a. Impacts Related to the Provision of Public Services (Fire Protection, Police Protection, Schools, and Parks)

Because the destruction of ODS would occur within the capacity of existing facilities, this offset protocol would not result in demand for public services in new locations or at levels substantially different than existing demand. Therefore, implementation of the ODS Offset Protocol would have less than significant impacts to public services.

b. Protocol Mitigation

Mitigation is not warranted.

16. Recreation

a. Impacts to Recreational Facilities

No new ODS destruction facilities would be constructed and existing facilities would not be expanded such that existing or proposed recreational facilities would be altered or removed with implementation of the ODS Offset Protocol. Therefore, the ODS Offset Protocol would not result in new or accelerated impacts to existing recreation areas or facilities. This would be a less than significant impact.

b. Protocol Mitigation

Mitigation is not warranted.

17. Transportation and Traffic

a. Impacts to Surrounding Roadways, Conflicts with Congestion Management Programs, Changes in Air Traffic Patterns, Adequate Emergency Access, or Conflicts with Adopted Policies, Plans, or Programs Regarding Public Transit, Bicycle, or Pedestrian Facilities

Construction-Related Traffic

There is sufficient capacity at existing ODS destruction facilities to accept ODS. No new or expanded facilities would be required. Thus, no construction-related traffic impacts would occur and this impact would be less than significant.

Operational Impacts

Implementation of this offset protocol would require recovery of ODS from refrigeration equipment and foam sources involving collection at centralized facility locations and transportation of ODS to existing ODS destruction facilities. These transportation activities may occur by rail, waterborne craft, or aircraft, but primarily by trucks, which would consequently increase traffic levels. The exact number of daily trips required for such operations or the location of affected roadway segments is not known at this time. However, transport of ODS from recovery facilities to destruction facilities would be anticipated to only occur when the collection of a full cargo load is achieved and, thus, would not be expected to result in frequent truck trips in any one location such that ADT volumes would substantially increase. This would be a less than significant impact.

Air Traffic Patterns, Emergency Access, Parking Capacity, or Alternative Transportation

Implementation of the ODS Offset Protocol would not result in the construction of any new housing or office buildings and; thus, would not generate long-term operational traffic that would conflict with applicable programs, plans, ordinances, or policies; result in a change in air traffic patterns; substantially increase hazards due to design features;

or result in inadequate emergency access. As a result, this impact would be less than significant.

b. Protocol Mitigation

Mitigation is not warranted.

18. Utilities and Service Systems

a. Wastewater Services, Stormwater Facilities, Water Demand and Supply, Landfill Capacity, and Solid Waste Regulation

No new facilities would be constructed with implementation of the ODS Offset Protocol as ODS would be transported to existing ODS destruction facilities. Therefore, implementation of this offset protocol would not be anticipated to generate a substantial demand for additional solid waste, electricity, natural gas, wastewater services and treatment, and water supply services and/or demand that would result in exceedance of adopted utility and service system and policies. Impacts to utilities and service systems would be less than significant.

b. Protocol Mitigation

Mitigation is not warranted.

19. Indirect Impacts of the Protocol

No indirect impacts of the ODS Offset Protocol are expected.

20. Summary of Impacts and Mitigation Measures

The identified significance determinations are summarized in the table below and reflect the programmatic nature of the analysis of the reasonably foreseeable methods of compliance with the cap-and-trade regulation. This FED analysis addresses broadly defined types of impacts without the ability to determine the specific project locations, facility size, character, or site-specific environmental characteristic affected. However, as shown in the summary table, implementation of the ODS Offset Protocol would result in no impact or a less than significant impact for all of the resources areas.

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a. Summary Impact Matrix for the Ozone Depleting Substances Offset Protocol

Ozone Depleting Substances Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Aesthetics			
1. Scenic Vistas, Scenic Resources, Visual Character, Light and Glare	Less than Significant	Mitigation is not warranted	Less than Significant
Agricultural and Forest Resources			
1. Conversion of Farmland to Non-Farmland Uses, Conflicts with Existing Zoning, Conflicts with Williamson Act Contracts	Less than Significant	Mitigation is not warranted	Less than Significant
2. Conflict with Forest Land or Timberland Zoning, Loss or Conversion of Forest Land to Non-Forest Uses	Less than Significant	Mitigation is not warranted	Less than Significant
Air Quality			
1. Conflicts with Adopted Air Quality Plan, Violate Air Quality Standards, Cumulatively Significant Increases in Criteria Pollutants	No Impact (construction) Less than Significant (operation)	Mitigation is not warranted	No Impact (construction) Less than Significant (operation)
2. Odors	Less than Significant	Mitigation is not warranted	Less than Significant

Ozone Depleting Substances Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Biological Resources			
1. Special-Status Species and Habitat Impacts, Impacts on Wetlands, Interfere with Movement of Native or Migratory Fish, or Local Biological Protection or Habitat Conservation Plans outbuildings, covered shelters, or on-site utility lines.	Less than Significant	Mitigation is not warranted	Less than Significant
Cultural Resources			
1. Impacts to Archaeological Resources, Historic Resources, Paleontological Resources, or Undocumented Human Remains	No Impact	Mitigation is not warranted	No Impact
Energy Demand			
1. Impacts to Energy Resources	Less than Significant	Mitigation is not warranted	Less than Significant
Geology, Soils, and Minerals			
1. Seismic Impacts, Unstable Soils Impacts, Expansive Soils Impacts, and Impacts to Mineral Resources	No Impact	Mitigation is not warranted	No Impact
Greenhouse Gases			
1. Generate Significant Greenhouse Gas Emissions or Conflict with Applicable Greenhouse Gas Plan	Beneficial	Mitigation is not warranted	Beneficial

Ozone Depleting Substances Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Hazards and Hazardous Materials			
1. Impacts Related to the Routine Disposal and Transport of Hazardous Materials, Impacts Related to the Release of Hazardous Materials to the Environment or Near Schools, Impacts Related to Creating a Significant Hazard to the Public or the Environment, and Impacts Related to Creation of Hazards Near Airports	Less than Significant	Mitigation is not warranted	Less than Significant
2. Impacts Related to Creating Conflicts with Emergency Response Plan or Exposure of People to Increase Wildland Fire Risks	Less than Significant	Mitigation is not warranted	Less than Significant
Hydrology, Water Quality and Water Supply			
1. Impacts Related to Violation of Existing Water Quality Standards and Waste Discharge Requirements, Depletion of Groundwater, Alteration of Existing Drainage, Degradation of Water Quality, and Exceedance of the Capacity of Existing Stormwater Systems	Less than Significant	Mitigation is not warranted	Less than Significant
2. Impacts Related to Placement of Housing in a 100-year Flood Hazard Area, Redirecting Flood Flows, Exposure of People to Flooding from Levee or Dam Failure, or Inundation by Seiche, Tsunami, or Mudflow	No Impact	Mitigation is not warranted	No Impact

Ozone Depleting Substances Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Land Use			
1. Impacts Related to Conflicts with Relevant Plans or Policies, Impacts Related to Division of an Established Community	Less than Significant	Mitigation is not warranted	Less than Significant
Noise			
1. Impacts Related to Generation of Noise in Excess of Applicable Standards, Exposure of Sensitive Receptors to Excessive Groundborne Vibration, and Substantial Increases in Ambient Noise Levels	Less than Significant	Mitigation is not warranted	Less than Significant
2. Impacts Related to Exposure of People Residing or Working in the Area to Excessive Airport-Related Noise Levels	Less than Significant	Mitigation is not warranted	Less than Significant
Employment, Population, and Housing			
1. Impacts Related to Displacement of Housing or People and Substantial Inducement of Population Growth	Less than Significant	Mitigation is not warranted	Less than Significant
Public Services			
1. Impacts Related to the Provision of Public Services (Fire Protection, Police Protection, Schools, and Parks)	Less than Significant	Mitigation is not warranted	Less than Significant

Ozone Depleting Substances Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Recreation			
1. Impacts to Recreational Facilities	Less than Significant	Mitigation is not warranted	Less than Significant
Transportation and Traffic			
1. Impacts to Surrounding Roadways, Conflicts with Congestion Management Programs, Changes in Air Traffic Patterns, Adequate Emergency Access, or Conflicts with Adopted Policies, Plans, or Programs Regarding Public Transit, Bicycle, or Pedestrian Facilities	Less than Significant	Mitigation is not warranted	Less than Significant
Utilities and Service Systems			
1. Wastewater Services, Stormwater Facilities, Water Demand and Supply, Landfill Capacity, and Solid Waste Regulation	Less than Significant	Mitigation is not warranted	Less than Significant

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D. Compliance Offset Protocol for Livestock (Digester) Projects

1. Protocol Description and Compliance Responses

a. Livestock Offset Protocol Description

Basic processes

Under the Livestock Offset Protocol, specific livestock digester offset projects would be implemented to better manage manure on livestock operations (i.e., dairy cattle and swine farms), which would result in the reduction of GHG emissions. Manure treated and stored under anaerobic conditions decomposes to produce CH_4, which, if uncontrolled, is emitted to the atmosphere. This situation predominantly occurs when livestock operations manage waste with anaerobic liquid-based systems (e.g., in lagoons, ponds, tanks, or pits). Installation of a digester captures and destroys CH_4 from anaerobic manure treatment and/or storage facilities on livestock operations. Under this offset protocol, digesters would be used to destroy CH_4 that would otherwise have been emitted to the atmosphere from uncontrolled anaerobic treatment and/or storage of manure. Captured biogas can be destroyed on-site (e.g., flaring), transported for off-site use (e.g., through gas distribution or transmission pipeline), or used to power on-site stationary combustion devices.

Under the Livestock Offset Protocol, a livestock digester offset project would be eligible to register for offsets if it meets the following criteria:

- Must be located within the U.S.,
- Must define baseline anaerobic operational conditions, and
- GHG reductions must be above and beyond BAU conditions.

Under this offset protocol, overall emissions and emission reductions in CH_4 and CO_2 would be accounted for in determining the net emissions of livestock digester offset projects. CH_4 would be captured by the digester and could be used in place of fossil fuels to power on-site stationary combustion devices, such as generators or pumping systems. In addition to CH_4, this offset protocol accounts for changes in direct CO_2 emissions from mobile and stationary combustion sources within the assessment boundary, which can either increase or decrease depending on project and farm specifics. Digesters also result in biogenic CO_2 emissions (not be confused with project-generated CO_2 emissions discussed above), which are not included in the net GHG emissions reduction calculation.

Digesters are one element of a biogas control system (BCS). In addition to the digester, these systems also typically include an engine to run the system, a gas-handling system (e.g., pipeline), a gas-use device (e.g., flare or electric generation system), and a manure storage tank or pond to hold the treated effluent prior to land application or hauling off the site (U.S. EPA 2002). All elements of the BCS are included in the

Livestock Offset Protocol. The solids remaining after the digestion process can be used as a soil amendment or as animal bedding. BCSs can accommodate manure handled as a liquid, slurry, or semi-solid (with little or no bedding added) and are best suited at facilities that have stable year round manure production and collect at least 50 percent of the manure daily (U.S. EPA 2002). The size of the system is determined primarily by the number and type of animals served by the operation, the amount of dilution water added, and the desired retention time.

There are three main types of commercial BCSs that have been used to manage manures of varying solids contents: covered lagoon digesters, complete mix digesters, and plug flow digesters. A covered lagoon digester is an earthen lagoon fitted with a cover that collects biogas as it is produced from the manure. A complete mix digester is a tank, constructed of either reinforced concrete or steel, with a gas-tight cover. The digester contents are mixed periodically, either by a motor-driven impeller or a pump. A plug flow digester is a long, relatively narrow tank, often built below ground level, with a gas-tight cover and is only used for dairy manure (U.S. EPA 2002).

Plug flow and complete mix digesters are typically heated systems that operate at a constant temperature year-round, producing stable gas production rates that support gas-to-energy applications in all climates. Heated digesters must be situated so that they can be heated, usually with hot-water piping running in and out of the digester tank. It may be possible to heat the water using the CH_4 produced by the digester. The tanks should also be insulated to help it retain optimal operating temperatures. Partially burying tanks in the ground or piling soil up against the sides of the tank help to insulate the tank (Balsam 2006).

Covered lagoon digesters are not heated, and this can affect gas production rates. In warmer climates, gas production is relatively stable during all seasons and can be used for energy gas uses. However, in colder climates, gas production from covered lagoon digesters is lower during winter months and gas use may be limited to flaring (U.S. EPA 2002).

Biogas produced by the BCS is primarily CH_4 and CO_2, with traces of H_2S, and other gases. Use of raw biogas in heating equipment and in internal combustion engines may cause early failures because of the corrosive nature of the H_2S and water vapor. Therefore, biogas should be properly cleaned using appropriate scrubbing and separation techniques before use (Balsam 2006).

b. Livestock Offset Protocol Compliance Responses

Under the Livestock Offset Protocol, it is expected that the following reasonably foreseeable compliance responses would occur:

- New digester facilities would most likely be constructed at or adjacent to existing livestock operations (e.g., dairy cattle and swine farms) and, though less likely, it is possible that new digester facilities could be constructed in communities at locations central to participating livestock operations. These new community

digester facilities would still be anticipated to be relatively near existing livestock operations in existing agricultural areas.

- Facility footprint areas would be cleared of debris or other landscaping.
- Construction activities may include: site grading; trenching; foundation preparation; construction of digesters, holding tanks, and/or buildings; installation of underground pipelines; delivery of materials and construction equipment; and transport of construction workers to and from the site.
- Operational activities would include transport of maintenance personnel and equipment to and from the facility. The operation of community digester facilities could also include the transport of manure from nearby livestock operations.
- Some digester types would require energy to mix and/or heat the wastes.
- Heated digesters could also destroy pathogens. The use of digesters could help to prevent untreated manure from reaching ground water.
- Biogas could be used to replace purchased energy for electricity, heating, or cooling. For most farms, the most profitable biogas use option would be to fuel an internal combustion engine or gas turbine driven generator to produce electricity. Other options include using biogas to fuel forced air furnaces, direct fire room heaters, and adsorption chillers.
- Recovering waste heat from biogas powered engines could provide heat or hot water for farm use.
- If gas combustion is used, emissions such as NO_xNO_x would occur. The locations of new digester facilities could be influenced by air quality regulations, if an area is out of attainment for ozone precursors.
- Livestock wastes may be hauled from the site.

c. Protocol Impacts and Mitigation Measures

Implementation of the Livestock Offset Protocol would incentivize construction of new digesters at selected livestock operations (e.g., dairy cattle and swine farms) to better manage manure. These new digester facilities would consist of buildings, storage tanks, pipelines, and gas flares on 1-3 acres at or adjacent to existing livestock operations. Livestock digester offset projects would be anticipated to include a digester, an engine to run the system, a gas-use device (e.g., flare or electric generation system), underground pipelines, and a tank or pond to store the treated effluent as such are typical to this type of facility. As mentioned above, though new digester facilities would most likely be constructed at or adjacent to existing livestock operations (e.g., dairy cattle and swine farms), it is possible that new digester facilities could be constructed in communities at locations central to participating livestock operations. These new

community digester facilities would still be in close proximity to existing livestock operations and in existing agricultural areas, and include similar components as discussed above on relatively small project areas. A livestock digester offset project implemented under the Livestock Offset Protocol would only qualify to be issued offset credits if it is located within the U.S. At this time, the specific location, type, and number of livestock digester offset projects that would occur under this offset protocol in-state and out-of-state cannot be known and would be dependent upon a variety of factors that are not within the control of ARB including: economic costs, offset demand, permitting requirements, environmental constraints, and other market constraints. Nonetheless, the analysis provided herein provides a reasonable description of the types of environmental impacts that could occur with implementation of livestock digester offset projects under the Livestock Offset Protocol.

2. Aesthetics

a. Scenic Vistas, Scenic Resources, Visual Character, Light and Glare

Construction of new digester facilities implemented under the Livestock Offset Protocol may require minor expansion of the development footprint or potentially result in greater massing or blockage of views to offsite areas. However, because livestock digester offset projects would occur at or adjacent to existing livestock operations and would involve structures of similar size, scale, and visual character to those typical of agricultural operations, substantial changes to visual character or surrounding visual features would not occur. As mentioned above, it is possible that new digester facilities could be constructed in communities at locations central to participating livestock operations. These new community digester facilities would still be relatively near existing livestock operations, in existing agricultural areas, and include similar components as discussed above on relatively small project areas. Aesthetic impacts would be less than significant.

b. Protocol Mitigation

Mitigation is not warranted.

3. Agriculture and Forest Resources

a. Conversion of Farmland to Non-Farmland Uses

New digester facilities would be considered an agricultural use because of handling of waste from the livestock operations (i.e., dairy cattle and/or swine). Regarding impacts to agricultural resources, it is unknown how much of the land on which digesters would be constructed is currently designated as Prime Farmland, Unique Farmland or Farmland of Statewide Importance; land zoned for agricultural uses; or land under a Williamson Act contract. As mentioned above, new digester facilities (including any potential new community digester facilities) would be considered an agricultural use; they support livestock operations by providing additional benefits from the livestock manure. Therefore, development of new digester facilities would be consistent with existing agricultural uses or would not result in the conversion of agricultural land to

non-agricultural uses. Therefore, the Livestock Offset Protocol would have a less than significant farmland conversion impacts.

b. Conflict with Existing Zoning or Agricultural Use and Conflicts with Williamson Act Contracts

No conflicts with existing zoning for agricultural uses would be expected to result from construction of new digester facilities at or adjacent to existing livestock operations (or any potential new community digester facilities relatively near and located in locations central to existing livestock operations) because these existing livestock operations and nearby areas (e.g., farms) would be considered an agricultural use. Thus, new digester facilities (including any potential new community digester facilities) would be anticipated to be compatible with existing on-site or nearby agricultural-related operations. Similarly, no conflicts with Williamson Act Contracts would occur because new digester facilities would be compatible with existing on-site and nearby agricultural-related operations. No impacts related to conflicts with existing zoning or Williamson Act contracts would result from implementation of the Livestock Offset Protocol.

c. Conflict with Existing Zoning for Forest Land, Timberland, or Timber Production Zone

No conflicts with zoning for forest land or loss of forest, timberland, or timber production zones would be expected to result from construction of new digester facilities at or adjacent to existing livestock operations (or any potential new community digester facilities relatively near and located in locations central to existing livestock operations). These new digester facilities would generally not be located in forested areas as they would typically be located at or adjacent to (or relatively near in the case of new community digester facilities) existing agricultural operations in agricultural areas. Therefore, implementation of the Livestock Offset Protocol would have no impacts on forest resources.

d. Protocol Mitigation

Mitigation is not warranted.

4. Air Quality

a. Conflicts with Adopted Air Quality Plan, Violate Air Quality Standards, Cumulatively Significant Increases in Criteria Pollutants

New digester facilities would be anticipated to result in an increase in criteria pollutant (and precursors) and TAC emissions associated with short-term construction activities (e.g., use of heavy-duty construction equipment) and long-term operations (e.g., flaring and engine use) and in the case of new potential community digester facilities mobile-source emissions from transport activities. A net increase in criteria pollutant (or precursor) emissions in an extreme nonattainment area, such as the San Joaquin Valley Air Basin, which contains many existing livestock operations, would not be permitted by the local air district. With regards to all situations, livestock digester offset projects implemented under the Livestock Offset Protocol would be in accordance, as

required by law, with all applicable federal, state, and local regulations (e.g., dust control) and regulatory oversight requirements. These would include, but not limited to the following:

- Apply for, secure, and comply with all appropriate air quality permits for project construction and operations from the local agencies with air quality jurisdiction and from other applicable agencies (e.g., U.S. EPA), if appropriate, prior to construction mobilization.
- Compliance with the CAA and the CCAA (e.g., NSR and BACT criteria if applicable).
- Comply with local plans, policies, ordinances, rules, and regulations regarding air quality-related emissions and associated exposure.
- Proponents must coordinate with local land use agencies to seek entitlements for development including completing all necessary environmental review requirements (e.g., CEQA in California, NEPA if federal action is involved, local entitlements).
- Based on the results of the environmental review, proponents must implement all mitigation identified in the environmental document.
- The local land use agency or governing body must certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development.
- For projects located in PM nonattainment areas, prepare and comply with a dust abatement plan that addresses emissions of fugitive dust during construction and operation of the project.

According to the Livestock Offset Protocol, a livestock offset project can only be accepted if it complies with these and other applicable laws and regulations. Consequently, the potential impacts to air quality would likely not be adverse, and where an adverse impact may occur, would be less than significant with the required compliance with laws and regulations. Therefore, implementation of the Livestock Offset Protocol would not result in conflict with adopted air quality plans, violation of AAQS, and/or cumulatively significant increases in criteria pollutants. This impact would be less than significant.

b. Odors

Although odors from livestock operations are exempt from direct regulation by the local air quality jurisdiction under California law (CHSC 41705[a]), odor can still be considered a perceived nuisance and an environmental impact. Factors that would affect odor impacts include the design of new digester facilities and exposure duration. Typical manure management activities associated with livestock operations include

collection, treatment, storage, and reuse of the manure. Manure management at livestock operations without digester facilities typically flush and/or scrape manure into on-site storage ponds or stockpiles. Manure in these storage ponds and stockpiles naturally undergo decomposition, and as a result, odorous compounds (e.g., NH_3 and H_2S) are released into the environment. However, the implementation of new digester facilities at existing livestock operations would result in the manure being placed into the digester rather than into on-site storage ponds or stockpiles. This would limit open air degradation (resulting in the breakdown of volatile organic compounds through anaerobic processes that would occur in the closed system) and would result in more control over the exhaust emissions. However, new community digester facilities could locate new odor sources from the transport, storage, and pre-processing activities of odiferous cow manure and other organic substrates near existing sensitive receptors. As a result, implementation of the Livestock Offset Protocol could result in the exposure of sensitive receptors to objectionable odors. This impact would be potentially significant.

c. Protocol Mitigation

Project-specific impacts and mitigation would be identified as appropriate during the environmental review by agencies with regulatory jurisdiction over site-specific activities at the time such projects are proposed. Recognized practices that are routinely required to avoid and/or minimize odor impacts include:

- Proponents shall implement an Odor Management Plans (OMP) as part of each application submitted to establish digester facilities. The OMP shall specifically address odor control associated with digester operations and include:
    - A list of potential odor sources.
    - Identification and description of the most likely sources of odor.
    - Identification of potential, intensity, and frequency of odor from likely sources.
    - A list of odor control technologies and management practices that could be implemented to minimize odor releases, which shall include the establishment of criteria for time limits related to on-site retention of undigested co-substrates (e.g., organic co-substrates must be put into the digester within 48 hours of receipt), provide negative pressure buildings for indoor unloading, treat collected foul air in a biofilter or air scrubbing system, establish contingency plans for operating downtime (e.g., equipment malfunction, power outage), manage delivery schedule to facilitate prompt handling of odorous cosubstrates, protocol for monitoring and recording odor events, and protocol for reporting and responding to odor events.

Because ARB is not responsible for implementation of project-specific mitigation and the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the

potentially significant impacts. Consequently the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable.

5. Biological Resources

a. Special-Status Species and Habitat Impacts and Impacts on Wetlands

New digester facilities associated with a specific livestock operations would likely be constructed at or adjacent to the existing livestock operation where natural habitats are expected to be absent or limited. If a centralized or community digester facility was proposed, it would be expected to be within the immediate agricultural area in close proximity to manure sources to minimize costs of transport and/or pipelines. Therefore, while the presence of native habitats cannot be ruled out, adverse effects to sensitive biological resources would not be likely. The requirement of the protocol to comply with existing federal, state, and local laws would also serve to protect special-status species and their habitats, if potential adverse effects could occur. Construction of new digesters at existing livestock operations or community digester facilities located near livestock operations may require minor expansion of the development footprint or affect adjacent or nearby areas where special-status species or sensitive habitats are not likely, but could be present. Depending on the status of the species and the nature of the habitat disturbance, compliance with the federal Endangered Species Act, Clean Water Act, Section 404, or related state laws could be required. According to the Livestock Offset Protocol, a livestock offset project can only be accepted if it complies with these and other applicable laws and regulations. Consequently, the potential impact to special-status species and sensitive habitats would likely not be adverse, and where an adverse impact may occur, would be less than significant with the required compliance with laws and regulations protecting those resources. The impact on sensitive species and habitats, including wetlands, from implementation of the Livestock Offset Protocol would be less than significant.

b. Interfere with Movement of Fish or Wildlife Species or Wildlife Corridors, Conflicts with Tree Preservation Policies, Habitat Conservation Plans, or Natural Community Conservation Plans

Due to the relatively small size of the new digester facilities at livestock operations and that they would typically be located at or adjacent to existing livestock operations, native fish and wildlife movement or use of nursery sites would not expected to be impeded and would be considered a less than significant impact. A community digester would involve development of a new facility, but its location would be expected to be in close proximity to the sources of manure to minimize costs of transport and/or pipelines. Therefore, it would most likely be within an area that is already agricultural in character, so that the potential for interference with fish or wildlife movement or tree preservation policies would be less than significant.

Digester projects implemented under the Livestock Offset Protocol could conceivably conflict with adopted HCPs, NCCPs, other conservation plans or other policies to protect natural resources; however, a digester offset project would not be accepted under the Livestock Offset Protocol, if it was not consistent with these plans; the protocol requires compliance with all local, state and federal laws and regulations. Thus, it is required that any digester offset project implemented under the Livestock Offset Protocol would be consistent with regional or local laws and regulations protecting fish, wildlife, and trees. This impact is less than significant.

c. Protocol Mitigation

Mitigation is not warranted.

6. Cultural Resources

a. Impacts to Archaeological Resources, Historic Resources, Paleontological Resources, or Undocumented Human Remains

Construction of new digester facilities could potentially cause direct damage to or destroy identified or undocumented historical resources of an architectural or archaeological nature, to archaeological resources that may be historical resources or unique archaeological resources, to undocumented human remains not interred in cemeteries or marked, formal burials, or to unique paleontological resources or sites by ground-disturbance or demolition activities at the surface or in the subsurface, particularly during trenching for underground pipelines and utility infrastructure. Direct impacts to such resources may result from, but not be limited to, the immediate disturbance of the materials, features or deposits, whether from vegetation removal, compaction or vibrations resulting from vehicle travel over the surface, earth-moving activities, excavation, or demolition of overlying structures.

Indirect operational impacts to identified or undocumented historical resources or significant archaeological resources would be related to potential alteration of the resource setting through the introduction of visual project elements (e.g., covered lagoons/ponds, aboveground digester tanks, on-site electrical production units, biogas processing facilities, maintenance activities, and/or ancillary facilities) that contrast with the setting of the historical or significant archaeological resource and could diminish the integrity of the resource's significant historic features. Other indirect impacts to consider include increased erosion due to clearance and preparation of the project area, or from inadvertent damage or outright vandalism to exposed resource materials due to improved accessibility. Increased human exposure to sensitive paleontological sites would have the potential to damage or destroy paleontological resources in those areas determined to be paleontologically sensitive.

Based on the cultural setting and knowledge of the occurrence and extent of known archaeological resources throughout California, the U.S., and considering new digester facilities would be located in the upper layer(s) of soil, a project area in or adjacent to existing livestock operations (or in the case of new potential community digester facilities relatively near existing livestock operations in rural/agriculture areas) may be

low to moderately sensitive for the discovery of subsurface prehistoric archaeological resources, ethnohistoric archaeological resources, historic-period archaeological resources, and human remains. The potential for discovery of prehistoric or ethnohistoric archaeological resources is considered highly sensitive within or near slope or topographic features, or within natural resource collecting areas considered culturally sensitive for Native Americans, such as natural rivers and streams, springs, ponds/lakes, ecotones, ridgetops, mid-slope benches, flat benches, meadows, oak groves, and source areas for raw materials. The same potential impacts would be expected in other areas of the U.S.

The potential for discovery of historic-period archaeological resources is considered highly sensitive within or near areas directly related to the state's transportation, industrial, commercial and agricultural past, traces of which, such as railroad grades and bridges, irrigation canals, houses, farm and ranch buildings, early lumber industry structures, cemeteries, and early mining operations, can occur in virtually any setting or landform.

The potential for impacts on paleontological resources by site preparation activities, rough grading, and construction of shallow foundations is low, particularly in previously disturbed soils. Deeper excavations for the construction of covered earthen ponds, lagoons or pipelines; however, may extend into and disturb in-situ geologic units of high paleontological potential where Pleistocene or older sedimentary rock units occur at or near the surface in the Central Valley, along the foothills surrounding and the edges of the Central Valley, portions of the Coast Ranges, the Peninsular Ranges, Transverse Ranges, and the southeastern deserts, or where Holocene-age Cahuilla Lake Beds underlie a project area in Imperial County. Pleistocene or older sedimentary rock units may also exist within very short depths beneath areas mapped as Holocene alluvium, particularly in the Central Valley.

Construction of new digester facilities within areas underlain by metamorphic and igneous rocks, like the Modoc Plateau, the mountains in northern California, the bulk of the Sierra Nevada range, and portions of the Coast Ranges, have a low paleontological potential.

Because of the possible presence of identified or undocumented historical resources, significant or unique archaeological resources, undocumented human remains, or unique paleontological resources or sites that could be directly or indirectly disturbed, materially altered, or demolished by project implementation, implementation of the Livestock Offset Protocol would result in potentially significant impacts to cultural resources.

b. Protocol Mitigation

The following mitigation applies to address potentially significant cultural resources impacts:

- Retain the services of cultural resources specialists with training and background that conforms to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61 (36 CFR Part 61).

- Seek guidance from the State Historic Preservation Officer and federal lead agencies, as appropriate, for coordination of Nation-to-Nation consultations with the Native American Tribes.

- Proponents of the livestock digester projects shall consult with lead agencies early in the planning process to identify the potential presence of cultural properties. The agencies shall provide the project developers with specific instruction on policies for compliance with the various laws and regulations governing cultural resources management, including coordination with regulatory agencies and Native American Tribes.

- Proponents of the livestock digester projects shall define the area of potential effect (APE) for each project, which is the area within which project construction and operation may directly or indirectly cause alterations in the character or use of historic properties. The APE shall include a reasonable construction buffer zone and laydown areas, access roads, and borrow areas, as well as a reasonable assessment of areas subject to effects from visual, auditory, or atmospheric impacts, or impacts from increased access.

- Proponents of the livestock digester projects shall retain the services of a paleontological resources specialist with training and background that conforms with the minimum qualifications for a vertebrate paleontologist as described in Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontologic Resources: Standard Procedures, Society of Vertebrate Paleontology, 1995 http://www.vertpaleo.org/society/polstateconfomimpactmigig.cfm.

- Proponents of the livestock digester projects shall conduct initial scoping assessments to determine whether proposed construction activities, if any, could disturb formations that may contain important paleontological resources. Whenever possible potential impacts to paleontological resources should be avoided by moving the site of construction or removing or reducing the need for surface disturbance. The scoping assessment shall be conducted by the qualified paleontological resources specialist in accordance with applicable agency requirements.

- The project proponent's qualified paleontological resources specialist shall determine whether paleontological resources would likely be disturbed in a project area on the basis of the sedimentary context of the area and a records search for past paleontological finds in the area. The assessment may suggest areas of high known potential for containing resources. If the assessment is inconclusive a surface survey is recommended to determine the fossilferous potential and extent of the pertinent sedimentary units within the project site. If the site contains areas of high potential for significant paleontological resources and avoidance is not possible, prepare a paleontological resources management and mitigation plan that addresses the following steps:

  a) a preliminary survey (if not conducted earlier) and surface salvage prior to construction;

  b) physical and administrative protective measures and protocols such as halting work, to be implemented in the event of fossil discoveries;

  c) monitoring and salvage during excavation;

  d) specimen preparation;

  e) identification, cataloging, curation and storage; and

  f) a final report of the findings and their significance.

  g) Choose sites that avoid areas of special scientific value.

Because ARB is not responsible for implementation of project-specific mitigation and the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable.

7. Energy Demand

a. Impacts to Energy Resources

The construction and operation of new digester facilities implemented under the Livestock Offset Protocol could result in additional energy demands to construct and operate the facilities. However, in many cases, the energy produced by the digesters may be reused to supplement existing energy demands at the facility. For example, CH_4 would be specifically reduced by the digester and could be used in place of fossil fuels to power on-site stationary combustion devices, such as generators or pumping systems. This could reduce the facility's reliance on fossil fuel demand and would be a beneficial impact of this offset protocol. New digester facilities would not conflict with existing energy conservation plans, would not require the expansion of energy facilities

because of the dispersed location and low energy demands, would not result in significant impacts to peak energy demands, and would be constructed in compliance with existing energy standards. Overall, the Livestock Offset Protocol would result in less than significant energy demand impacts.

b. Protocol Mitigation

Mitigation is not warranted.

8. Geology, Soils, and Minerals

a. Seismic Impacts, Unstable Soils Impacts, Expansive Soils Impacts

The specific design details, siting locations, and hazards for a particular livestock digester offset project are not known at this time. These facilities would be located within the U.S. and would be subject to design standards of the Uniform Building Code (UBC) at a minimum and other state (e.g., California Building Code) and local design requirements, which would ensure that appropriate design measures would be implemented to prevent adverse seismic, soils, or other stability impacts. Therefore, geology and soils impacts would be less than significant.

Installation of new digester facilities could result in some minor soil erosion impacts; however, project proponents would be required to implement livestock digester offset projects in accordance with all federal, state and local erosion, drainage, and water quality requirements including RWQCB SWPPP requirements and local grading policies. These requirements would ensure that adequate measures would be in place to prevent the substantial erosion of onsite soils and prevent adverse water quality impacts. Therefore, this would be a less than significant impact.

b. Impacts to Mineral Resources

New livestock digester offset projects would occur at or adjacent to existing livestock operations (or in the case of new potential community digester facilities relatively near existing livestock operations in existing agriculture areas) where the operation thereof would not be anticipated to interfere with any known mineral resources or extraction activities because of the conflict in land uses. Therefore, this would be a less than significant impact on mineral resources.

c. Protocol Mitigation

Mitigation is not warranted.

9. Greenhouse Gases

a. Generate Significant Greenhouse Gas Emissions or Conflict with Applicable Greenhouse Gas Plan

New digester facilities would be anticipated to result in an increase in CO_2 emissions associated with CH_4 flaring and engine use; however, this would be in place of release of CH_4, which has GWP approximately 21 times that of CO_2. In other words, flaring CH_4 and associated conversion to CO_2 has a net GHG reduction benefit. Livestock digester offset projects would result in an overall net reduction in GHG emissions and associated climate change impacts would be beneficial.

b. Protocol Mitigation

Mitigation is not warranted.

10. Hazards and Hazardous Materials

a. Impacts Related to the Routine Disposal and Transport of Hazardous Materials

Construction and operation of new digesters would involve the use, storage, and disposal of hazardous materials including: fuels, lubricants, CH_4, and leachate. New digester facilities (including new potential community digester facilities) would need to be approved and permitted by local land use and regulatory agencies prior to their implementation. Part of this process would involve review of the proposed system to ensure it is located in an appropriate location for such use, that it appropriately plans for potential spills and other accident conditions, and that the storage and handling of hazardous materials occurs in accordance with all applicable federal, state and local regulations. In addition, it is likely that new digester facilities would require permits to operate, which would have requirements for the regular monitoring and inspection of facilities and operations. Therefore, the Livestock Offset Protocol would result in less than significant hazard impacts related to the routine transport, storage, and use of hazardous materials, and the potential for accidental spills or other releases of hazardous materials.

b. Impacts Related to the Release of Hazardous Materials to the Environment or Near Schools

New digester facilities would be located at or adjacent to existing livestock operations. As mentioned above, it is possible that new digester facilities could be constructed in communities at locations central to participating livestock operations. However, these new community digester facilities would still be relatively near existing livestock operations and in existing agricultural areas. These operations would be typically incompatible with urban areas and schools and are; therefore, usually sited in agricultural/rural areas substantially distant from sensitive receptors such as schools. Therefore, the Livestock Offset Protocol would result in less than significant impacts related to hazardous materials releases within ¼-mile of school facilities.

c. Impacts Related to Creating a Significant Hazard to the Public or the Environment

New digester facilities could be in locations that are within two miles of a public or private airport or may be located on sites that would be included on a list of hazardous material sites compiled pursuant to Government Code Section 65962.5. New digester facilities (including new potential community digester facilities) would need to be approved and permitted by local land use and regulatory agencies prior to their implementation. This process would ensure that the new digester facilities are sited appropriately in consideration of surrounding land uses and onsite conditions. Further, these new digester facilities would be appropriately permitted and monitored to ensure that they do not create significant hazards to employees, the public, or environment. Thus, implementation of the Livestock Offset Protocol would result in a less than significant impact related to creating a significant hazard to the public or the environment.

d. Impacts Related to Creating Conflicts with Emergency Response Plan

New digester facilities would be located at or adjacent to existing livestock operations. As mentioned above, it is possible that new digester facilities could be constructed in communities at locations central to participating livestock operations. However, these new community digester facilities would still be relatively near existing livestock operations and in existing agricultural areas. Thus, implementation of the Livestock Offset Protocol would not be anticipated to impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. This would be a less than significant impact.

e. Exposure of People to Increased Wildland Fire Risks

While there may be a potential risk for wildland fires in areas at, adjacent to, or relatively near existing livestock operations in agricultural areas, the new digester facilities (including new potential community digester facilities) would be appropriately sited and monitored such that they would not increase the risk wildland fires to a level greater than would be expected under existing conditions. Further, owners/operators of new digester facilities would be required to provide adequate fire suppression and water supply pressure consistent with applicable requirements. Therefore, implementation of the Livestock Offset Protocol would result in less than significant impacts in regards to the exposure of people to increased wildland fire risks.

f. Protocol Mitigation

Mitigation is not warranted.

11. Hydrology and Water Quality

a. Alteration of Existing Drainage, Degradation of Water Quality, and Exceedance of the Capacity of Existing Stormwater Systems, Impacts Related to Placement of Housing in a 100-year Flood Hazard Area, Redirecting Flood Flows, Exposure of People to Flooding from Levee or Dam Failure, or Inundation by Seiche, Tsunami, or Mudflow

New digester facilities (including new potential community digester facilities) would typically require a relatively small construction footprint and be required to comply with appropriate local and state erosion and water quality requirements (NPDES, SWPPP). Further, proposed buildings would be required to be constructed with the latest federal, state, and local building code standards, which would address issues related to flooding and appropriate siting of proposed facilities to avoid substantial impacts to rivers or streams. No housing is proposed; therefore, impacts related to exposing housing or people to flooding would not occur. Potential erosion and flooding impacts would be less than significant.

b. Impacts Related to Violation of Existing Water Quality Standards and Waste Discharge Requirements, Deplete Groundwater Supplies or Impair Groundwater Quality

New digester facilities would not typically result in substantial demands for groundwater or surface water supplies. Therefore, implementation of this offset protocol would not be expected to result in the substantial depletion of groundwater supplies. This would be a less than significant impact.

With regard to water quality, implementation of new digester facilities under proper design conditions may reduce the potential for surface and groundwater contamination, because untreated farm waste is a commonly known contributor to water quality degradation. By using manure and manure sludge as feedstock for energy generation, the amount of manure stored on site or in lagoons would be reduced and; therefore, the potential for washing manure into surface waters during rainstorms would be reduced. Similarly, the potential for manure to leach into shallow groundwater would be reduced.

The RWQCB recently released the Dairy Manure Digester and Co-Digester Facilities Draft Programmatic EIR (July 2010) (RWQCB 2010), which evaluates the environmental effects of implementing digester and co-digester facilities. The Draft EIR is incorporated by reference. Dairy manure digester and co-digester projects can provide benefits to the State by generating renewable energy and by GHG emissions (RWQCB 2010). Further, as described above, under proper handling conditions, the digester facilities would result in beneficial impacts to surface and groundwater quality compared to existing conditions.

However, it should be noted that if not properly designed or operated, these projects could result in the contamination of local waterways and groundwater resources. Further, application of improperly treated digestate and/or improper application timing or rates of digestate to agricultural land may lead to increased nitrogen oxide emissions,

soil contamination, and/or nutrient leaching if not properly monitored. To prevent these impacts the RWQCB's EIR has identified mitigation to that requires the WDRs for each facility to identify specific measures to prohibit surface water discharges of digestate, appropriately setback facilities from surface water bodies, line all detention ponds, apply digestate at agronomic rates to surrounding lands, and implement a groundwater monitoring system to detect when leaks occur. With certification of RWQCB's EIR and approval of the waste discharge regulatory program for digesters and co-digesters, adequate requirements and regulations would be in place to ensure that digester facilities would not result in significant groundwater quality impacts. In the interim, the RWQCB would be responsible to approving appropriate individual WDRs for each new digester facility. While a programmatic approach to permitting these facilities may not be approved, the existing WDR process would ensure that appropriate preventative design, operation, and monitoring requirements are in place to prevent significant and adverse surface and groundwater quality impacts.

According to the Livestock Offset Protocol, a livestock offset project can only be accepted if it complies with all applicable laws and regulations for its given location. Consequently, potential impacts would likely not be adverse, and where an adverse impact may occur, would be less than significant with the required compliance with laws and regulations protecting those resources. Therefore, impacts to surface and groundwater quality would be less than significant.

c. Seiche, Tsunami, Mudflow

With regards to potential risks from a tsunami or seiche, digester offset projects, would be sited at or adjacent to existing cattle and swine farms. It is expected that the original permitting of these facilities considered the potential impacts of tsunami's and seiches such that no significant risks to people or property would occur. Further, because the BSC facilities would not be of substantial size (typical agricultural buildings on 1-2 acres) it is not anticipated that significant risks to people or property would result. This would be a less than significant impact.

d. Protocol Mitigation

Mitigation is not warranted.

12. Land Use and Planning

a. Impacts Related to Conflicts with Relevant Plans or Policies

In general, it is anticipated that new digester facilities (including new potential community digester facilities) would be designed to be consistent with applicable land use policies and regulations. Further, project proponents would be required to secure appropriate permits from local jurisdiction in order to operate the facilities. Manure management would generally be considered an integral part of the agricultural land use for livestock operations and would not result in significant land use conflicts. This would be a less than significant impact.

b. Impacts Related to the Division of an Established Community

New digester facilities located in or adjacent to existing livestock operations (or in the case of new potential community digester facilities relatively near existing livestock operations and in existing agricultural areas) at individual farms would not present a significant threat of physically dividing an established community. If required, pipelines would be underground and would not divide communities except temporarily during construction periods. Therefore, the potential for implementation of the Livestock Offset Protocol to physically divide an established community would be considered less than significant.

As mentioned above, it is possible that new community digester facilities could be developed to handle the manure management needs of multiple livestock operations. These facilities would likely be centrally located in regards to the participating livestock operations and would continue to be located in agricultural areas. The siting and operation of new community digester facilities would be subject to the approval of local land use agencies, which would consider the potential community impacts of such facilities. Because community digesters would be properly sited in accordance with local land use agency requirements and would be located in agricultural areas, it is unlikely that these projects would result in the division of an established community. This would be a less than significant impact.

c. Protocol Mitigation

Mitigation is not warranted.

13. Noise

a. Impacts Related to Generation of Noise in Excess of Applicable Standards, Exposure of Sensitive Receptors to Excessive Groundborne Vibration, and Substantial Increases in Ambient Noise Levels

Construction Impacts

Construction noise levels in the vicinity of new digester offset projects would fluctuate depending on the particular type, number, size, and duration of usage for the varying equipment. The effects of construction noise largely depend on the type of construction activities occurring on any given day, noise levels generated by those activities, distances to noise sensitive receptors, and the existing ambient noise environment in the receptor's vicinity. Construction generally occurs in several discrete stages, each phase requiring a specific complement of equipment with varying equipment type, quantity, and intensity. These variations in the operational characteristics of the equipment change the effect they have on the noise environment of the project site and in the surrounding community for the duration of the construction process.

To assess noise levels associated with the various equipment types and operations, construction equipment can be considered to operate in two modes, mobile and stationary. Mobile equipment sources move around a construction site performing tasks

in a recurring manner (e.g., loaders, graders, dozers). Stationary equipment operates in a given location for an extended period of time to perform continuous or periodic operations. Operational characteristics of heavy construction equipment are additionally typified by short periods of full-power operation followed by extended periods of operation at lower power, idling, or powered-off conditions.

Additionally when construction-related noise levels are being evaluated, activities that occur during the more noise-sensitive evening and nighttime hours are of increased concern. Because exterior ambient noise levels typically decrease during the late evening and nighttime hours as traffic volumes and commercial activities decrease, construction activities performed during these more noise-sensitive periods of the day can result in increased annoyance and potential sleep disruption for occupants of nearby residential uses.

The site preparation phase typically generates the most substantial noise levels because of the on-site equipment associated with grading, compacting, and excavation, which uses the noisiest types of construction equipment. Site preparation equipment and activities include backhoes, bulldozers, loaders, and excavation equipment (e.g., graders and scrapers). Erection of large structural elements and mechanical systems could require the use of a crane for placement and assembly tasks, which may also generate noise levels. Although a detailed construction equipment list is not currently available, based on this project type it is expected that the primary sources of noise would include backhoes, bulldozers, and excavators. Noise emission levels from typical types of construction equipment are shown in Table 3-4.

Based on the information provided in Table 3-4 and accounting for typical usage factors of individual pieces of equipment and activity types, on-site construction could result in hourly average noise levels of 87 dBA L_{eq} at 50 feet and maximum noise levels of 90 dBA L_{max} at 50 feet from the simultaneous operation of heavy-duty equipment and blasting activities. Based on these and general attenuation rates, exterior noise levels at noise-sensitive receptors located within thousands of feet from project sites could exceed typical standards (e.g., 50/60 dBA L_{eq}/L_{max} during the daytime hours and 40/50 dBA L_{eq}/L_{max} during the nighttime hours).

Additionally, construction activities may result in varying degrees of temporary groundborne noise and vibration, depending on the specific construction equipment used and activities involved. Groundborne noise and vibration levels caused by various types of construction equipment and activities (e.g., bulldozers, blasting) are summarized in Table 3-4. Similar to the above discussion, although a detailed construction equipment list is not currently available, based on this project type it is expected that the primary sources of groundborne vibration and noise would include bulldozers and trucks. According to FTA, levels associated with the use of a large bulldozer and trucks are 0.089 and 0.076 in/sec PPV (87 and 86 VdB) at 25 feet, respectively, as shown in Table 3-4. With respect to the prevention of structural damage, construction-related activities would not exceed recommended levels (e.g., 0.2 in/sec PPV). However, based on FTA's recommended procedure for applying a

propagation adjustment to these reference levels, bulldozing and truck activities could exceed recommended levels with respect to the prevention of human disturbance (e.g., 80 VdB) within 275 feet.

Thus, implementation of the Livestock Offset Protocol could result in projects that generate short-term construction noise (and vibration) levels in excess of applicable standards or that result in a substantial increase in ambient levels at nearby sensitive receptors. As a result, this impact would be potentially significant.

Operational Impacts

With respect to operational-related activities, minimal (if any) new additional personnel would be needed to operate the facilities at individual livestock operations because they would be located in association with existing operations. Consequently, these projects would not be anticipated to result in a doubling of ADT volumes on affected roadway segments (e.g., the amount associated with a substantial traffic noise increase as discussed above). However, operational-related activities at new community digester facilities including the increase in frequent and routine truck traffic to and from the facility could result in a doubling of ADT volumes on affected roadway segments. As a result, this impact would be potentially significant.

Implementation of livestock digester offset projects could introduce new on-site stationary noise sources (e.g., pumps, motors, compressors, fans, generators, flares, and other equipment). Noise levels associated with these types of sources vary greatly, but would generally range from 70 dBA L_{eq} to 80 dBA L_{max} at 50 feet. Based on these and general attenuation rates, exterior noise levels at noise-sensitive receptors located within hundreds of feet from the location of the project sites could exceed typical standards (e.g., 50/60 dBA L_{eq}/L_{max} during the daytime hours and 40/50 dBA L_{eq}/L_{max} during the nighttime hours). Thus, implementation of the Livestock Offset Protocol could generate long-term operational noise levels in excess of applicable standards or that result in a substantial increase in ambient levels at nearby sensitive receptors. As a result, this impact would be potentially significant.

b. Impacts Related to Exposure of People Residing or Working in the Area to Excessive Airport-Related Noise Levels

Lastly, because the Livestock Offset Protocol would not require any new land use types for which people would reside, any new locations where people would work, or any new airport locations or a substantial increase in airport-activities, implementation would not expose people residing or working in the project area to excessive airport-related noise levels. As a result, this impact would be less than significant.

c. Protocol Mitigation

The following mitigation applies to addressing potentially significant construction and operational noise impacts:

- Ensure noise-generating construction activities (including truck deliveries, pile driving and blasting) are limited to the least noise-sensitive times of day (e.g., weekdays during the daytime hours) for projects near sensitive receptors.
- Consider use of noise barriers, such as berms, to limit ambient noise at property lines, especially where sensitive receptors may be present.
- Ensure all project equipment has sound-control devices no less effective than those provided on the original equipment.
- All construction equipment used shall be adequately muffled and maintained.
- Consider use of battery powered forklifts and other facility vehicles.
- Ensure all stationary construction equipment (i.e., compressors and generators) is located as far as practicable from nearby sensitive receptors or shielded.
- Properly maintain mufflers, brakes and all loose items on construction and operational-related vehicles to minimize noise and ensure safe operations. Keep truck operations to the quietest operating speeds. Advise about downshifting and vehicle operations in sensitive communities to keep truck noise to a minimum.
- Use noise controls on standard construction equipment; shield impact tools.
- Consider use of flashing lights instead of audible back-up alarms on mobile equipment.
- Install mufflers on air coolers and exhaust stacks of all diesel and gas-driven engines.
- Equip all emergency pressure relief valves and steam blow-down lines with silencers to limit noise levels.
- Contain facilities within buildings or other types of effective noise enclosures.
- Employ engineering controls, including sound-insulated equipment and control rooms, to reduce the average noise level in normal work areas.

Because ARB is not responsible for implementation of project-specific mitigation and the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the

potentially significant impacts. Consequently the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable.

14. Employment, Population, and Housing

a. Impacts Related to Displacement of Housing or People and Substantial Inducement of Population Growth

The construction of new digester facilities would typically require small crews (reasonably estimated to be 5-10 people); however, demand for these crews would be temporary (6-12 months per project). Therefore, it would be anticipated that the need for a substantial number of construction workers to migrate to a project area would not occur and that a sufficient construction employment base would likely be available. Further, minimal (if any) new additional personnel would be needed to operate the facilities (e.g., new digester facilities would be located in or adjacent to existing livestock operations and in the case of new potential community digester facilities relatively nearby). Therefore, implementation of the Livestock Offset Protocol would result in less than significant impacts related to population, employment, and housing.

b. Protocol Mitigation

Mitigation is not warranted.

15. Public Services

a. Impacts Related to the Provision of Public Services (Fire Protection, Police Protection, Schools, and Parks)

New digester facilities (including new potential community digester facilities) would not require new additional housing or other facilities that could result in increased demands for public services as construction crews would be small and of temporary demand, and minimal (if any) new additional personnel would be needed to operate the new digester facilities. Therefore, implementation of the Livestock Offset Protocol would result in less than significant impacts related to the provision of public services.

b. Protocol Mitigation

Mitigation is not warranted.

16. Recreation

a. Impacts to Recreational Facilities

Because the new digester facilities (including new potential community digester facilities) would be located in or adjacent to existing livestock operations (or relatively near in the case for community facilities) and in existing agricultural areas, this offset protocol would not be expected disrupt or otherwise affect the use or value of recreational areas, wilderness areas, or recreational facilities. New digester facilities (including new potential community digester facilities) would not require new additional

housing or other facilities as construction crews would be small and of temporary demand, and minimal (if any) new additional personnel would be needed to operate the new digester facilities. This would be a less than significant impact.

b. Protocol Mitigation

Mitigation is not warranted.

17. Transportation and Traffic

a. Impacts to Surrounding Roadways, Conflicts with Congestion Management Programs, Changes in Air Traffic Patterns, Adequate Emergency Access, or Conflicts with Adopted Policies, Plans, or Programs Regarding Public Transit, Bicycle, or Pedestrian Facilities

Construction Impacts

Although detailed information is not currently available, new digester facilities located in or adjacent to existing livestock operations or relatively near in the case of new potential community digester facilities in existing agricultural areas would be anticipated to result in short-term construction traffic (primarily motorized) from worker commute- and material delivery-related trips. The amount of construction activity would fluctuate depending on the particular type, number, and duration of usage for the varying equipment; and the phase of construction (e.g., construction, erection). These variations would affect the amount of project-generated traffic for both worker commute trips and material deliveries. Depending on the amount of trip generation and the location of the livestock digester offset projects, implementation could conflict with applicable programs, plans, ordinances, or policies (e.g., performance standards, congestion management); and/or result in hazardous design features and emergency access issues from road closures, detours, and obstruction of emergency vehicle movement, especially due to project-generated heavy-duty truck trips. As a result, this impact would be potentially significant.

Operational Impacts

With respect to operational-related activities, minimal (if any) new additional personnel would be needed to operate the facilities located at individual farms because they would be located in association with existing livestock operations. Consequently, these projects would not be expected to result in substantial traffic volumes on local roadways. Thus, implementation of the Livestock Offset Protocol would not generate long-term operational traffic that conflicts with applicable programs, plans, ordinances, or policies; result in a change in air traffic patterns; substantially increase hazards due to design features; or result in inadequate emergency access. As a result, this impact would be less than significant.

With respect to operational-related activities at new potential community digester facilities, trucks would haul manure to the digester on a regular schedule and some new personnel (i.e., reasonably estimated to be 5-10 people) may be needed to operate the facilities. These would be located in existing agricultural areas relatively near existing

livestock operations. It is likely that roadways surrounding these areas would not be congested and could support the addition of traffic associated with hauling of waste and employee commutes without requiring expansion of existing facilities. Therefore, it would not expected that operational activities would generate long-term operational traffic that conflict with applicable programs, plans, ordinances, or policies (e.g., performance standards, congestion management); and/or result in hazardous design features and emergency access issues from road closures, detours, and obstruction of emergency vehicle movement, especially due to project-generated heavy-duty truck trips. As a result, this impact would be less than significant.

b. Protocol Mitigation

The following mitigation measure shall be implemented for potentially significant construction-related traffic impacts.

- Minimize the number and length of access, internal, service and maintenance roads and use existing roads when feasible.
- Provide for safe ingress and egress to/from the proposed project site. Identify road design requirements for any proposed roads, and related road improvements.
- If new roads are necessary prepare a road siting plan and consult standards contained in federal, state, or local requirements. The plans should include design and construction protocols to ensure roads will meet the appropriate standards and be no larger than necessary to accommodate their intended functions (e.g., traffic volume and weight of vehicles). Access roads should be located to avoid or minimize impacts to washes and stream crossings, follow natural contours and minimize side-hill cuts. Roads internal to a project site should be designed to minimize ground disturbance. Excessive grades on roads, road embankments, ditches, and drainages should be avoided, especially in areas with erodible soils.
- Prepare a Construction Traffic Control Plan and a Traffic Management Plan.

Because ARB is not responsible for implementation of project-specific mitigation and the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable.

18. Utilities and Service Systems

a. Wastewater Services, Stormwater Facilities, Water Demand and Supply, Landfill Capacity, and Solid Waste Regulation

The construction and operation of new digester facilities (including new potential community digester facilities) implemented under the Livestock Protocol could result in additional demands on utilities and service systems depending on their design. In some cases, the energy produced by the digesters may be reused to supplement existing energy demands at the facility; however, this cannot be guaranteed. For example, CH_4 would be specifically captured by the digester and could be used in place of fossil fuels to power on-site stationary combustion devices, such as generators or pumping systems. This could reduce the facility's reliance on fossil fuel demand. This would be a beneficial impact.

A byproduct of project operations, material drawn from the anaerobic digester (called sludge or effluent) is rich in nutrients (e.g., NH_3, phosphorus, potassium, and more than a dozen trace elements) and can be used as a soil conditioner or as a livestock feed additive when dried. The recycling of sludge and effluent from livestock digester offset projects under this offset protocol could have an economic value to the project proponent and could result in the diversion of a substantial portion of animal waste from the wastewater treatment and solid waste stream. This would be a beneficial impact.

In California, the digester offset projects would be required to comply with CEQA and where a federal permit is required or if the project occurs on federal land or is located outside of California in the U.S., NEPA would be required and all appropriate entitlements would be obtained through the entitlement process. All of the livestock digester offset projects would occur within the United States. However, some of these livestock digester offset projects may occur in areas where CEQA and/or NEPA do not apply. While a detailed environmental review process may not be employed, it is expected that many of the jurisdictions where these new digester facilities would be located have development policies and regulations in place that would provide for the orderly development of new projects including processes for securing appropriate water supply entitlements, compliance with wastewater discharge requirements, and assessing utility demand and available capacity of service systems. The local jurisdictions would be responsible for ensuring adequate services are provided and for approving the livestock digester offset project for implementation. New digester facilities located out-of-state that would not be subject to NEPA and do not require assessment of utilities and service systems would result in demands for utilities and/or service systems; however, these demands would not be expected to exceed the capacity of local service providers or result in adverse environmental impacts because these new digester facilities would be relatively small and contained, would be additive to existing livestock operations and activities in existing agriculture areas in the case of new potential community digester facilities such that new supporting infrastructure would not be required, and would not be concentrated in any one area such that they would result in a substantial demand for utilities and service systems (e.g., solid waste facilities capacity, electricity, natural gas, wastewater services, water demand and

supply services, wastewater treatment requirements, and solid waste regulations) above and beyond what could be provided by existing service providers and resources. This would be a less than significant impact.

b. Protocol Mitigation

Mitigation is not warranted.

19. Indirect Impacts

No indirect impacts of the Livestock Offset Protocol have been identified.

20. Summary of Impacts and Mitigation Measures

The significance determinations identified below reflect the programmatic nature of the analysis of the reasonably foreseeable methods of compliance with the Cap-and-Trade regulation. Because of this, the FED analysis addresses broadly defined types of impacts without the ability to determine the specific project locations, facility size, character, or site-specific environmental characteristic affected. As a result many impact issues are determined to be potentially significant because of the inherent uncertainties about the relationship between future projects and environmentally sensitive resources or conditions. This is a conservative approach (i.e., tending to overstate environmental impacts), in light of these uncertainties, to satisfy the good-faith, full disclosure purpose of CEQA. When specific projects are proposed and subjected to project-level environmental review, it is expected that many of the impacts identified as potentially significant can be avoided or maintained at a less than significant level.

Another inherent uncertainty in the FED analysis is the degree of implementation of mitigation for potentially significant impacts. While ARB is responsible for adopting the cap-and-trade regulation and implementing the program, it does not have the authority over the proposal, approval or implementation of project or location-specific actions or offset projects. Additionally, federal land management agencies must approve projects and require mitigation for impacts on their lands and state and /or federal permits are needed for specific environmental resource impacts, such as take of endangered species, filling of wetlands, and streambed alteration.

Because ARB is not responsible for implementation of project-specific mitigation and the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable.

a. Summary Impact Matrix for the Livestock Offset Protocol

Livestock Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Aesthetics			
1. Scenic Vistas, Scenic Resources, Visual Character, Light and Glare	Less than Significant	Mitigation is not warranted	Less than Significant
Agricultural and Forest Resources			
1. Conversion of Farmland to Non-Farmland Uses	Less than Significant	Mitigation is not warranted	Less than Significant
2. Conflict with Existing Zoning or Agricultural Use and Conflicts with Williamson Act Contracts	No Impact	Mitigation is not warranted	No Impact
3. Conflict with Existing Zoning for Forest Land, Timberland, or Timber Production Zone	No Impact	Mitigation is not warranted	No Impact
Air Quality			
1. Conflicts with Adopted Air Quality Plan, Violate Air Quality Standards, Cumulatively Significant Increases in Criteria Pollutants	Less than Significant	Mitigation is not warranted	Less than Significant
2. Odors	Potentially Significant	Mitigation is warranted. • Proponents shall implement an Odor Management Plans (OMP) as part of each application submitted to establish digester facilities. The OMP shall specifically address odor control associated with digester operations and include: o A list of potential odor sources. o Identification and description of the most likely	Significant and Unavoidable

Livestock Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
		sources of odor. o Identification of potential, intensity, and frequency of odor from likely sources. o A list of odor control technologies and management practices that could be implemented to minimize odor releases, which shall include the establishment of criteria for time limits related to on-site retention of undigested co-substrates (e.g., organic co-substrates must be put into the digester within 48 hours of receipt), provide negative pressure buildings for indoor unloading, treat collected foul air in a biofilter or air scrubbing system, establish contingency plans for operating downtime (e.g., equipment malfunction, power outage), manage delivery schedule to facilitate prompt handling of odorous cosubstrates, protocol for monitoring and recording odor events, and protocol for reporting and responding to odor events.	
Biological Resources			
1. Special-Status Species and Habitat Impacts and Impacts on Wetlands	Less than Significant	Mitigation is not warranted	Less than Significant
2. Interfere with Movement of Fish or Wildlife Species or Wildlife Corridors, Conflicts with Tree Preservation Policies, Habitat Conservation Plans, or Natural Community Conservation Plans	Less than Significant	Mitigation is not warranted	Less than Significant

Livestock Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Cultural Resources			
1. Impacts to Archaeological Resources, Historic Resources, Paleontological Resources, or Undocumented Human Remains	Potentially Significant	Mitigation is warranted. The following mitigation applies to address potentially significant cultural resources impacts: • • Retain the services of cultural resources specialists with training and background that conforms to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61 (36 CFR Part 61). • • Seek guidance from the State Historic Preservation Officer and federal lead agencies, as appropriate, for coordination of Nation-to-Nation consultations with the Native American Tribes. • • Proponents of the livestock digester projects shall consult with lead agencies early in the planning process to identify the potential presence of cultural properties. The agencies shall provide the project developers with specific instruction on policies for compliance with the various laws and regulations governing cultural resources management, including coordination with regulatory agencies and Native American Tribes. • • Proponents of the livestock digester projects shall define the area of potential effect (APE) for each project, which is the area within which project construction and operation may directly or indirectly cause alterations in the character or use of historic properties. The APE shall include a reasonable construction buffer zone and laydown areas, access roads, and borrow areas, as well as a reasonable assessment of areas subject to effects from visual, auditory, or atmospheric impacts, or impacts from increased access. • • Proponents of the livestock digester projects	Significant and Unavoidable

Livestock Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
		shall retain the services of a paleontological resources specialist with training and background that conforms with the minimum qualifications for a vertebrate paleontologist as described in Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontologic Resources: Standard Procedures, Society of Vertebrate Paleontology, 1995 http://www.vertpaleo.org/society/polstateconfomimpactmigig.cfm. • • Proponents of the livestock digester projects shall conduct initial scoping assessments to determine whether proposed construction activities, if any, could disturb formations that may contain important paleontological resources. Whenever possible potential impacts to paleontological resources should be avoided by moving the site of construction or removing or reducing the need for surface disturbance. The scoping assessment shall be conducted by the qualified paleontological resources specialist in accordance with applicable agency requirements. • • The project proponent's qualified paleontological resources specialist shall determine whether paleontological resources would likely be disturbed in a project area on the basis of the sedimentary context of the area and a records search for past paleontological finds in the area. The assessment may suggest areas of high known potential for containing resources. If the assessment is inconclusive a surface survey is recommended to determine the fossilferous potential and extent of the pertinent sedimentary units within the project site. If the site contains areas of high potential for significant paleontological resources and avoidance is not possible, prepare a paleontological resources management and mitigation plan that addresses	

Livestock Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
		the following steps: a) a preliminary survey (if not conducted earlier) and surface salvage prior to construction; b) physical and administrative protective measures and protocols such as halting work, to be implemented in the event of fossil discoveries; c) monitoring and salvage during excavation; d) specimen preparation; e) identification, cataloging, curation and storage; and f) a final report of the findings and their significance. g) Choose sites that avoid areas of special scientific value.	
Energy Demand			
1. Impacts to Mineral Resources	Less than Significant	Mitigation is not warranted	Less than Significant
Geology, Soils, and Minerals			
1. Seismic Impacts, Unstable Soils Impacts, Expansive Soils Impacts	Less than Significant	Mitigation is not warranted	Less than Significant
2. Impacts to Mineral Resources	Less than Significant	Mitigation is not warranted	Less than Significant
Greenhouse Gases			
1. Generate Significant Greenhouse Gas Emissions or Conflict with Applicable Greenhouse Gas Plan	Beneficial	Mitigation is not warranted	Beneficial

Livestock Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Hazards and Hazardous Materials			
1. Impacts Related to the Routine Disposal and Transport of Hazardous Materials	Less than Significant	Mitigation is not warranted	Less than Significant
2. Impacts Related to the Release of Hazardous Materials to the Environment or Near Schools	Less than Significant	Mitigation is not warranted	Less than Significant
3. Impacts Related to Creating a Significant Hazard to the Public or the Environment	Less than Significant	Mitigation is not warranted	Less than Significant
4. Impacts Related to Creating Conflicts with Emergency Response Plan	Less than Significant	Mitigation is not warranted	Less than Significant
5. Exposure of People to Increase Wildland Fire Risks	Less than Significant	Mitigation is not warranted	Less than Significant
Hydrology, Water Quality and Water Supply			
1. Alteration of Existing Drainage, Degradation of Water Quality, and Exceedance of the Capacity of Existing Stormwater Systems, Impacts Related to Placement of Housing in a 100-year Flood Hazard Area, Redirecting Flood Flows, Exposure of People to Flooding from Levee or Dam Failure, or Inundation by Seiche, Tsunami, or Mudflow	Less than Significant	Mitigation is not warranted	Less than Significant

Livestock Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
2. Impacts Related to Violation of Existing Water Quality Standards and Waste Discharge Requirements, Deplete Groundwater Supplies or Impair Groundwater Quality	Less than Significant	Mitigation is not warranted	Less than Significant
3. Seiche, Tsunami, Mudflow	Less than Significant	Mitigation is not warranted	Less than Significant
Land Use			
1. Impacts Related to Conflicts with Relevant Plans or Policies	Less than Significant	Mitigation is not warranted	Less than Significant
2. Impacts Related to the Division of an Established Community	Less than Significant	Mitigation is not warranted	Less than Significant
Noise			
1. Impacts Related to Generation of Noise in Excess of Applicable Standards, Exposure of Sensitive Receptors to Excessive Groundborne Vibration, and Substantial Increases in Ambient Noise Levels	Potentially Significant	Mitigation is warranted. The following mitigation applies to addressing potentially significant construction and operational noise impacts: • Ensure noise-generating construction activities (including truck deliveries, pile driving and blasting) are limited to the least noise-sensitive times of day (e.g., weekdays during the daytime hours) for projects near sensitive receptors. • Consider use of noise barriers, such as berms, to limit ambient noise at property lines, especially where sensitive receptors may be present. • Ensure all project equipment has sound-control devices no less effective than those provided on the original equipment. • All construction equipment used shall be adequately muffled and maintained. • Consider use of battery powered forklifts and	Significant and Unavoidable

Livestock Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
		other facility vehicles. • Ensure all stationary construction equipment (i.e., compressors and generators) is located as far as practicable from nearby sensitive receptors or shielded. • Properly maintain mufflers, brakes and all loose items on construction and operational-related vehicles to minimize noise and ensure safe operations. Keep truck operations to the quietest operating speeds. Advise about downshifting and vehicle operations in sensitive communities to keep truck noise to a minimum. • Use noise controls on standard construction equipment; shield impact tools. • Consider use of flashing lights instead of audible back-up alarms on mobile equipment. • Install mufflers on air coolers and exhaust stacks of all diesel and gas-driven engines. • Equip all emergency pressure relief valves and steam blow-down lines with silencers to limit noise levels. • Contain facilities within buildings or other types of effective noise enclosures. • Employ engineering controls, including sound-insulated equipment and control rooms, to reduce the average noise level in normal work areas.	
2. Impacts Related to Exposure of People Residing or Working in the Area to Excessive Airport-Related Noise Levels	Less than Significant	Mitigation is not warranted	Less than Significant
Employment, Population, and Housing			
1. Impacts Related to Displacement of Housing or People and Substantial	Less than Significant	Mitigation is not warranted	Less than Significant

Livestock Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Inducement of Population Growth			
Public Services			
1. Impacts Related to the Provision of Public Services (Fire Protection, Police Protection, Schools, and Parks)	Less than Significant	Mitigation is not warranted	Less than Significant
Recreation			
1. Impacts to Recreational Facilities	Less than Significant	Mitigation is not warranted	Less than Significant
Transportation and Traffic			
1. Impacts to Surrounding Roadways, Conflicts with Congestion Management Programs, Changes in Air Traffic Patterns, Adequate Emergency Access, or Conflicts with Adopted Policies, Plans, or Programs Regarding Public Transit, Bicycle, or Pedestrian Facilities	Potentially Significant (construction) Less than Significant (operation)	Mitigation is warranted (construction). The following mitigation measure shall be implemented for potentially significant construction-related traffic impacts. • Minimize the number and length of access, internal, service and maintenance roads and use existing roads when feasible. • Provide for safe ingress and egress to/from the proposed project site. Identify road design requirements for any proposed roads, and related road improvements. • If new roads are necessary prepare a road siting plan and consult standards contained in federal, state, or local requirements. The plans should include design and construction protocols to ensure roads will meet the appropriate standards and be no larger than necessary to accommodate their intended functions (e.g., traffic volume and weight of vehicles). Access roads should be located to avoid or minimize impacts to washes and stream crossings, follow natural contours and minimize side-hill cuts. Roads internal to a project	Significant and Unavoidable (construction) Less than Significant (operations)

Livestock Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
		site should be designed to minimize ground disturbance. Excessive grades on roads, road embankments, ditches, and drainages should be avoided, especially in areas with erodible soils. • Prepare a Construction Traffic Control Plan and a Traffic Management Plan. Mitigation is not warranted (operation).	
Utilities and Service Systems			
1. Wastewater Services, Stormwater Facilities, Water Demand and Supply, Landfill Capacity, and Solid Waste Regulation	Less than Significant	Mitigation is not warranted	Less than Significant

E. Compliance Offset Protocol for Urban Forest Projects

1. Protocol Description and Compliance Responses

a. Urban Forest Offset Protocol Description

Basic processes

Under the Urban Forest Offset Protocol, urban tree plantings would increase in urbanized areas to permanently increase carbon storage in the plant materials. Urban forests can reduce atmospheric CO_2 directly and indirectly. As trees grow throughout their lifetime, they remove CO_2 from the air through photosynthesis, resulting in carbon sequestration within the plant materials. This process involves transforming CO_2 into carbon, which is then used to create living matter—leaves, stems, trunk, roots (CAR 2010). Offset credits may be issued for the carbon sequestration benefits of increasing tree stocks in urban areas. While urban forests also have additional indirect GHG-reducing benefits, such as decreased demand for air conditioning use and energy through a reduction of building heat gain, these indirect GHG reductions are not verifiable and consequently not eligible to be issued offset credits.

Under the Urban Forest Offset Protocol, a project is a planned set of tree planting and maintenance activities to permanently increase carbon storage, taking into account GHG emissions associated with planting and maintenance of project trees. The tree planting projects must be implemented by local municipalities, educational campuses, utilities, and partner organizations (as the entities eligible under the protocol). Urban forest tree planting projects do not apply to large natural forested tracts (≥ 100 acres contiguously forested and containing dead and downed woody material) located within municipalities. To qualify for the offset, the tree planting project must occur within the United States within the boundary of an entity defined as:

- *Municipality* – along streets, in parks, municipal golf courses, cemeteries, parking lots, and other public open space areas, on private properties, and near municipal buildings and greenbelts.

- *Educational campuses* – along streets, near dorms, office buildings, recreational fields, and in parking lots, arboretums, and other open space areas.

- *Utility* – in parks, parking lots, within private property, along streets, and within open space areas (e.g., utility corridors or other property owned by utility agencies).

The offset project must obtain a net gain (i.e., new plantings must be greater than trees removed under the program) in the number of trees and tree carbon stocks. All trees planted must be in addition to or not subject to federal, state, or local tree planting regulations. To be eligible to be issued offset credits, the project must meet the following criteria:

- Provide a tree maintenance and monitoring plan.
- Record the spatial location of all tree planting sites with global positioning system (GPS) or Geographic Information System (GIS) software.
- Calculate the GHG sequestration achieved from growing planted trees.
- Plan for a project lifetime of a maximum of 100 years Account for the CO_2 emissions that would be generated to deliver and pla$_n$t trees and ongoing maintenance activities.
- Plant trees with an average spacing no less than 5 meters (approximately 15 feet).

If eligible, the project could receive offset credits for a period of 100 years. In general, carbon sequestration from urban forests can range from 16 kg/year (35 lb/year) for small, slow-growing trees with 8 to 15 cm diameter at breast height (dbh) (3 to 6 inch dbh) to 270 kg/year (600 lb) for larger trees growing at their maximum rate. Tree planting projects that are larger (i.e., approximately 1,000 tree sites) may offer greater economies of scale in achieving carbon sequestration because of their site and proximity.

b. Urban Forest Offset Protocol Compliance Responses

Under the Urban Forest Offset Protocol, it is expected that the following reasonably foreseeable compliance responses would occur:

- Urban forest offset project developers (i.e., municipalities, educational campuses, utilities, and partner organizations) would implement tree planting projects that would qualify for offset credits.
- New trees would be planted at an average spacing of no less than 5 meters along streets, near buildings, in open space areas, and on public and/or private properties. Trees would not be planted in large natural contiguously forested areas (≥ 100 acres and containing dead and downed woody material) within municipalities. In such areas, the Forest Offset Protocol would apply.
- Landscape installation activities would include the delivery of trees to the selected site, hauling of soil and other planting materials, use of small construction equipment (e.g., small generators, post-hole diggers, etc.), and transport of construction workers to and from the site.
- Tree maintenance activities would include periodic transport of maintenance personnel and equipment, use of small hand tools to trim and maintain trees (e.g., chainsaw, trimmers, etc.).

- Fertilizers and pesticides could be applied using standard techniques and safety protocols.
- Tree planting would occur in accordance with local planning policies and zoning ordinances, which often include protection of solar access, where appropriate.
- Trees planted for summer shading of buildings could create co-benefits related to reduced heat gain and attendant decreased energy demand for air conditioning.
- Tree species selection would be influenced by proper urban tree criteria, including compatibility with urban stresses and growing conditions, pollen and allergy sensitivity, and emissions.

The cost of GHG generating offsets from urban forest projects is relatively high, compared to other offset strategies, which may limit their implementation; however, because urban trees can provide multiple co-benefits (e.g., aesthetic, habitat, air quality, heat island cooling, etc.), urban forest offset projects are expected to occur despite the relatively high cost of project implementation.

c. Protocol Impacts and Mitigation

The impacts of implementing the Urban Forest Offset Protocol on each environmental resource area are described below.

2. Aesthetics

a. Scenic Vistas, Scenic Resources, Visual Character, Light and Glare

Under the Urban Forest Offset Protocol, offset projects would occur and involve the planting of trees along streets, near buildings, and in open space areas within existing municipalities, educational campuses, or utility service areas and properties. Irrigation systems may need to be installed and plantings would be routinely maintained (including activities such as pruning and application of pesticides and fertilizers). Because this protocol would result in increased urban greening, adverse aesthetic impacts are not anticipated. In many circumstances, the addition of trees to the urban landscape would improve scenic quality. No adverse impact to scenic vistas, scenic resources, or visual character would occur. Further, no lighting is proposed; therefore, no lighting impacts would occur. Overall, impacts would be less than significant.

b. Protocol Mitigation

Mitigation is not warranted.

3. Agriculture and Forest Resources

a. Conversion of Farmland to Non-Farmland Uses, Conflicts with Existing Zoning, Conflicts with Williamson Act Contracts

Urban forest projects would generally involve the installation and maintenance of trees in urban areas, parks, or other urban open spaces. The projects would be located in

existing urban communities. Existing lands would likely be modified for tree planting or forested areas. No new facilities or infrastructure would be constructed, although underlying irrigation systems could be constructed. Because urban forest projects would not occur on agricultural land, the protocol would not convert agricultural land to other uses, conflict with existing zoning for agricultural use or a Williamson Act contract. Therefore, there would be no impact on agriculture as a result of implementing the Urban Forest Offset Protocol.

b. Conflict with Forest Land or Timberland Zoning, Loss or Conversion of Forest Land to Non-Forest Uses

The Urban Forest Offset Protocol would not conflict with existing zoning for forest land, timberland, or timber production zone or result in conversion of forest to nonforest land or loss of forest land, because urban forest projects would be located in urban areas. Therefore, implementation of the Urban Forest Offset Protocol would not have an impact on forest resources.

c. Protocol Mitigation

Mitigation is not warranted.

4. Air Quality

a. Conflicts with Adopted Air Quality Plan, Violate Air Quality Standards, Cumulatively Significant Increases in Criteria Pollutants

Short-Term Construction Impacts

Equipment associated with tree installation would likely be minimal (i.e., fewer than five pieces of equipment per tree site), and installation at each tree site would likely be completed in less than one day. Associated short-term construction-related emissions would, therefore, be minimal and less than significant.

Operational Activities

Typical landscape maintenance activities (e.g., inspection, trimming, and tree care) would be required. Increases in such activities in support of urban forest projects could result in increased long-term operational emissions of criteria air pollutants and precursors. In addition, certain trees emit biogenic volatile organic compounds (VOCs), some of which are classified as reactive organic gases (ROG), an ozone precursor. Ozone formation is partly dependent on the ratio of ROG and NO_xNO_x in the atmosphere at any given time. In certain areas of the country, ozone formation is more dependent on the concentration of NO_xNO_x (i.e., NO_x-limited) and other areas are more dependent on the concentration of ROG (i.e., ROG-limited). In ROG-limited areas, addition of more urban tree species that emit ROG could increase ozone formation.

Urban forest projects pursuant to the protocol could only occur in the United States and would be required to be implemented by an eligible entity (i.e., municipality, educational campus, utility). The eligible entities are defined in part because they have existing capabilities and responsibilities for management of their properties and landscapes.

Also, the projects would be located in existing urban communities on small properties (100 acres or fewer), which would be located within existing urban services areas. It is not anticipated that substantial new permanent employment opportunities would be created by this offset protocol, because urban trees require the same type of maintenance as other managed landscapes and would likely be folded into existing landscaping and maintenance operations of the implementing entity and conducted by existing landscape maintenance personnel. Consequently, implementation of urban forest offset projects under the Urban Forest Offset Protocol would not generate substantial new employment opportunities or associated vehicle trips from employee commutes.

Impacts to air quality would largely be limited to increased landscaping and maintenance activities, and associated area-source emissions. The incremental increase in criteria pollutant emissions would be small, recognizing that landscape maintenance activities would be expected to already be occurring in some form on eligible entity properties. With regards to all situations, urban forest offset projects implemented under this offset protocol would be in accordance, as required by law, with all applicable federal, state, and local regulations and regulatory oversight requirements. These would include, but not limited to the following:

- Apply for, secure, and comply with all appropriate air quality permits for project construction and operations from the local agencies with air quality jurisdiction and from other applicable agencies (e.g., U.S. EPA), if appropriate, prior to construction mobilization.

- Compliance with the CAA and the CCAA (e.g., NSR and BACT criteria if applicable).

- Comply with local plans, policies, ordinances, rules, and regulations regarding air quality-related emissions and associated exposure.

- Proponents must coordinate with local land use agencies to seek entitlements for development including completing all necessary environmental review requirements (e.g., CEQA in California, NEPA if federal action is involved, local entitlements).

- Based on the results of the environmental review, proponents must implement all mitigation identified in the environmental document.

- The local land use agency or governing body must certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development.

According to the Urban Forest Offset Protocol, an urban forest offset project can only be accepted if it complies with these and other applicable laws and regulations. Consequently, the potential impacts to air quality would likely not be adverse, and

where an adverse impact may occur, would be less than significant with the required compliance with laws and regulations. Therefore, implementation of the Urban Forest Offset Protocol would not result in conflict with adopted air quality plans, violation of AAQS, and/or cumulatively significant increases in criteria pollutants. This impact would be less than significant.

b. Odors

Major sources of odor include such land use types as landfills, wastewater treatment plants, rendering plants, and others. Construction and operational-related activities associated with the implementation of an urban forest project would include tree installation and landscape maintenance activities (e.g., inspection, trimming, and tree care), none of which would be considered major sources of odor. Additionally, implementation of urban forest projects under the Urban Forest Offset Protocol would not generate substantial new employment opportunities and, thus, would not result in the location of any new sensitive receptors near existing sources of odor. As a result, implementation of the Urban Forest Offset Protocol would not be anticipated to result in the exposure of sensitive receptors to objectionable odors. This impact would be less than significant.

c. Protocol Mitigation

Mitigation is not warranted.

5. Biological Resources

a. Special-Status Species and Habitat Impacts, Impacts on Wetlands, Interfere with Movement of Native or Migratory Fish

Because projects under Urban Forest Offset Protocol would occur in existing urban communities on small properties (100 acres or fewer), would be limited in size and scope, and would enhance or increase existing urban landscaping, the protocol is not expected to result in substantial impacts to special-status species, riparian or other sensitive habitats, wetlands or other waters of the United States; interfere substantially with native wildlife or fish movement or use of nursery sites; or conflict with local plans or policies protecting biological resources or approved HCP, NCCP, or other habitat conservation plan. Impacts to biological resources from implementation of the Urban Forest Offset Protocol are considered less than significant.

b. Conflicts with Tree Preservation Policies, Habitat Conservation Plans, or Natural Community Conservation Plans

Implementation of the Urban Forest Offset Protocol would result in the planting of new trees (versus removal of trees) and, as a result would have no impacts related to conflicts with existing tree preservation policies. Further, tree plantings would occur in urban areas, parks, educational facilities such that the trees and other maintenance activities would not conflict with existing Habitat Conservation Plans or Natural

Community Conservation Plans, which typically occur in large open space areas. Therefore, no impact would occur.

c. Protocol Mitigation

Mitigation is not warranted.

6. Cultural Resources

a. Impacts to Archaeological Resources, Historic Resources, Paleontological Resources, or Undocumented Human Remains

Urban forest projects could potentially cause direct damage to or destruction of identified or undocumented historical resources of an architectural or archaeological nature, archaeological resources that may be historical resources or unique archaeological resources, undocumented human remains not interred in cemeteries or marked, formal burials, or unique paleontological resources or sites by subsurface ground-disturbance, particularly during tree planting in previously undisturbed ground. Direct impacts to archaeological or paleontological resources may result from, but not be limited to, the immediate disturbance of the materials, features or deposits, whether from earth-moving activities, excavation, compaction or vibrations resulting from vehicle travel over the surface. Direct impacts by urban forest projects to identified or undocumented historical resources of an architectural nature, including buildings, structures, objects or historic districts, may result from, but not be limited to, the introduction of visual elements such as dissimilar tree species that contrast with the setting of the historical resource and could diminish the integrity of the resource's significant historic features.

Other potential direct impacts to consider on a project level include damage to or destruction of identified cultural resources that have been preserved in parks or designated open space areas as mitigation for prior, unrelated projects. Such resources may have been preserved on the surface or buried by a sterile layer of fill.

Urban forest tree planting projects would be located in the upper layer(s) of soil, but there is the potential that undocumented cultural resources, including human remains, may be encountered and disturbed or destroyed during construction or ground-disturbing activities, particularly within previously undisturbed ground. Depending on its location, an urban forest project area may be highly sensitive for the discovery of subsurface prehistoric archaeological resources, ethnohistoric archaeological resources, or human remains, particularly where city or local municipalities, educational campuses, private properties, or utilities were built near or on top of topographic features or areas of natural resource productivity that were occupied or frequented by native peoples prior to the historic or protohistoric periods.

The potential for the introduction by urban forest projects of visual elements, such as dissimilar tree species that contrast with the setting of a historical resource, to identified or undocumented historical resources of an architectural nature is higher in areas that were settled at least 50 years ago during the historic period. Introduction of

such elements, which could diminish the integrity of the resource's significant historic features, is particularly high in urban cores or educational campuses, many of which encompass historic districts or contain historic buildings or structures.

The potential for impacts on paleontological resources by urban forest projects is low, particularly in previously disturbed soils. The probability for disturbance of known or discovery of currently unknown paleontological resources is higher in areas where in-situ Pleistocene or older sedimentary rock units of high paleontological potential occur at or near the surface in the valleys, along mountain foothills, portions of the mountain ranges, and the southwestern deserts. These units may also exist within very short depths beneath areas mapped as Holocene alluvium, particularly in the major valleys.

Because of the possible presence of identified or undocumented historical resources, significant or unique archaeological resources, undocumented human remains, or unique paleontological resources or sites that could be directly or indirectly disturbed, materially altered, or demolished by implementation of the Urban Forest Offset Protocol, construction-related impacts on cultural resources would be potentially significant.

b. Protocol Mitigation

The following mitigation applies to implementation of the Urban Forest Offset Protocol to address potentially significant cultural resources impacts:

- Proponents of urban forest offset projects will coordinate with local land use agencies to seek entitlements for development of the projects including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA). The local land use agency or governing body will certify that the environmental documents are prepared in compliance with applicable regulations and shall approve the projects for development.

- The local land use agency will implement all mitigation identified in the environmental documents to reduce or substantially lessen the environmental impacts of the projects.

- The local land use agency will retain the services of cultural resources specialists with training and background that conforms to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61 (36 CFR Part 61).

- The local land use agency will seek guidance from the State Historic Preservation Officer and federal lead agencies, as appropriate, for coordination of Nation-to-Nation consultations with the Native American Tribes.

- Proponents of the urban forest offset projects will consult with lead agencies early in the planning process to identify the potential presence of cultural properties. The agencies will provide the project developers with specific instruction on policies for compliance with the various laws and regulations

governing cultural resources management, including coordination with regulatory agencies and Native American Tribes.

- Proponents of the urban forest offset projects will define the area of potential effect (APE) for each project, which is the area within which project construction and operation may directly or indirectly cause alterations in the character or use of historic properties. The APE will include a reasonable construction buffer zone and laydown areas, access roads, and borrow areas, as well as a reasonable assessment of areas subject to effects from visual, auditory, or atmospheric impacts, or impacts from increased access.

- Where disturbance of paleontological resources is likely, proponents of the urban forest offset projects will retain the services of a paleontological resources specialist with training and background that conforms with the minimum qualifications for a vertebrate paleontologist as described in Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontologic Resources: Standard Procedures, Society of Vertebrate Paleontology, 1995 http://www.vertpaleo.org/society/polstateconfomimpactmigig.cfm.

- Proponents of the urban forest offset projects will conduct initial scoping assessments to determine whether proposed construction activities, if any, could disturb formations that may contain important paleontological resources. Whenever possible potential impacts to paleontological resources should be avoided by moving the site of construction or removing or reducing the need for surface disturbance. The scoping assessment will be conducted by the qualified paleontological resources specialist in accordance with applicable agency requirements.

- If the scoping assessment indicates that resources may be disturbed, the project proponent's qualified paleontological resources specialist will determine whether paleontological resources would likely be disturbed in a project area on the basis of the sedimentary context of the area and a records search for past paleontological finds in the area. The assessment may suggest areas of high known potential for containing resources. If the assessment is inconclusive a surface survey is recommended to determine the fossilferous potential and extent of the pertinent sedimentary units within the project site. If the site contains areas of high potential for significant paleontological resources and avoidance is not possible, prepare a paleontological resources management and mitigation plan that addresses the following steps:

  a) a preliminary survey (if not conducted earlier) and surface salvage prior to construction;

  b) physical and administrative protective measures and protocols such as halting work, to be implemented in the event of fossil discoveries;

c) monitoring and salvage during excavation;

d) specimen preparation;

e) identification, cataloging, curation and storage; and

f) a final report of the findings and their significance.

- Choose sites that avoid areas of special scientific value.

The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of projects proposed to develop credits under the Urban Forest Offset Protocol and their mitigation. The mitigation recommended to address significant cultural resources impacts would be effective in reducing impacts to less than significant levels; however, it would be within the jurisdiction of other agencies, so it is unknown at this time whether this mitigation would be implemented by the local agencies with authority to approve the projects. Therefore, for purposes of CEQA compliance, this impact is considered to be significant and unavoidable.

7. Energy Demand

a. Impacts to Energy Resources

Implementation of Urban Forest Offset Protocol under the offset program would not generate substantial demand for energy (e.g., electricity and natural gas) above and beyond what could be provided by existing service providers and resources because projects would generally would be small, would not involve new facilities, and would be incorporated within existing landscaping maintenance programs of qualified entities such that they would not substantially increase demands above service levels that could be provided. This would be a less than significant impact.

b. Protocol Mitigation

Mitigation is not warranted.

8. Geology, Soils, and Minerals

a. Seismic Impacts

No impacts related to exposing people or structures to adverse seismic impacts (e.g., ground shaking, fault rupture, ground failure or landslides) would occur under the Urban Forest Offset Protocol because the projects would involve the installation and maintenance of trees in existing urban communities and would not include construction of facilities. Further, no septic or alternative wastewater facilities are proposed; therefore, impacts associated with soils incapable of supporting such systems would not occur.

Offset projects under this protocol would result in the planting of trees in areas that currently support trees or other landscaping. Installation of the trees could result in

some minor soil erosion impacts; however, approved entities would be required to implement the offset projects in accordance with all state and local erosion, drainage, and water quality requirements. In California, this includes Regional Water Quality Control Board (RWQCB) Stormwater Pollution Prevention Plan (SWPPP) requirements and local grading policies. These requirements would ensure that adequate measures are in place to prevent the substantial erosion of onsite soils and prevent adverse water quality impacts. Therefore, this would be a less than significant impact.

b. Unstable Soils Impacts, Expansive Soils Impacts

Offset projects under this protocol would result in the planting of trees in areas that currently support trees or other landscaping. Therefore, no impacts related to unstable or expansive soils would occur.

c. Impacts to Mineral Resources

Urban forest offset projects would occur in existing urban areas, in parks, or at educational facilities where planting of trees would not interfere with any known mineral resources or extraction activities. Therefore, implementation of the Urban Forest Offset Protocol would have no impact on mineral resources.

d. Protocol Mitigation

Mitigation is not warranted.

9. Greenhouse Gases

a. Generate Significant Greenhouse Gas Emissions or Conflict with Applicable Greenhouse Gas Plan

Urban forest projects developed under the Urban Forest Offset Protocol would generally involve the installation and maintenance of trees in urban areas, parks, or other urban open space areas. Equipment associated with tree installation would likely be minimal (i.e., fewer than five pieces of equipment per tree site), and installation at each tree site would likely be completed in less than one day. Associated short-term construction-related emissions would, therefore, also be minimal.

Typical tree care activities (e.g., inspection, trimming) would be required. Increases in such activities in support of urban forest projects could result in increased long-term operational emissions of GHGs. Appendix A section A.3.4 (Tree Care Activities) of CAR's urban forest project protocol v 1.1 estimates the annual average CO_2 emissions associated with urban forest project vehicle and equipment use as 2.62 kg CO_2/planted project tree/year (McPherson and Simpson 1999 as cited in CAR 2008; pg 36). This increase in GHG emissions would be more than counterbalanced by the lowest end of the range of sequestration by small, slow-growing trees of 16 kg C/year (58.7 kg CO_2/yr) (CAR 2008; pg. 32).

Implementation of the Urban Forest Offset Protocol would result in an overall net reduction in GHG emissions. Therefore, implementation of Urban Forest Offset Protocol as part of the offset program would result in a beneficial impact.

b. Protocol Mitigation

Mitigation is not warranted.

10. Hazards and Hazardous Materials

a. Impacts Related to the Routine Disposal and Transport of Hazardous Materials

Typical landscape maintenance activities for urban forest offset projects could involve the use of hazardous materials including fuels and fertilizers. The eligible entities (i.e., municipality, educational campus, utility) are defined in part because they have existing capabilities and responsibilities for management of their properties and landscapes and are currently complying with appropriate federal, state, and local laws pertaining to the use, storage, and transportation of hazardous materials. The Urban Forest Offset Protocol would not change the policies by which the eligible entities implement their landscaping activities and would not change the regulations for handling hazardous materials. Therefore, implementation of the Urban Forest Offset Protocol would not result in any impact related to routine transport, use, or disposal of hazardous materials and the potential for accidental release of hazardous materials.

b. Impacts Related to the Release of Hazardous Materials to the Environment or Near Schools

Some urban forest projects may result in hazardous emissions or the handling of hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school or within two miles of a public or private airport because the urban forest projects may be in locations near schools or airports or located on school campus property. In all situations, the urban forest offset projects must be implemented in accordance with all applicable federal, state, and local regulations and regulatory oversight requirements and, therefore, would not result in the exposure of additional people to hazards above and beyond what currently occurs and what is currently regulated. Therefore, these hazard impacts would be less than significant.

c. Impacts Related to Creating a Significant Hazard to the Public or the Environment

Because an eligible entity would implement an urban forest offset project on lands under their control, it is not likely that any urban forest offset projects would be implemented on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5. Further, the planting of trees on a contaminated site would likely not be compatible with site remediation activities. Therefore, this would be a less than significant impact.

d. Impacts Related to Creating Conflicts with Emergency Response Plan or Exposure of People to Increased Wildland Fire Risks

Urban forest offset projects generally include planting and maintaining trees in urban areas. Any planting would need to comply with defensible space requirements, if offset project properties are on the edge of urban areas adjacent to wildlands. These activities would not be expected to result in a safety hazard for people residing or working in the project area, would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan, and would not 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. Therefore, these hazard impacts would be less than significant.

e. Impacts Related to Creation of Hazards Near Airports

The planting and maintaining of trees in existing urban areas would not introduce any new structures, features, or activities that would create hazards within close proximity of airports. Airports are not allowable covered entities under this protocol. Further, trees would be planted in existing urban areas where existing trees are present. Therefore, no impact would occur.

f. Protocol Mitigation

Mitigation is not warranted.

11. Hydrology and Water Quality

a. Impacts Related to Violation of Existing Water Quality Standards and Waste Discharge Requirements, Depletion of Groundwater, Alteration of Existing Drainage, Degradation of Water Quality, and Exceedance of the Capacity of Existing Stormwater Systems

Typical landscape maintenance activities (e.g., irrigation, application of fertilizers) would likely occur for offset projects, similar to other managed urban landscapes. The offset projects would be located in existing urban communities on small properties, which would be located within existing urban services areas with stormwater infrastructure. It is not anticipated that substantial new construction, grading, topography changes, water demand, runoff, or contaminant sources would be created by implementation of this protocol, because the urban trees require the same type of maintenance as other managed landscapes. The projects would likely be folded into existing landscaping and maintenance operations of the approved entity and conducted by existing landscape maintenance personnel. Consequently, implementation of the Urban Forest Offset Protocol as part of the offset program would result in less than significant hydrology and water quality impacts.

b. Impacts Related to Placement of Housing in a 100-year Flood Hazard Area, Redirecting Flood Flows, Exposure of People to Flooding from Levee or Dam Failure, or Inundation by Seiche, Tsunami, or Mudflow

The construction of new housing is not proposed under the Urban Forest Offset Protocol; therefore, no impacts would occur related to placement of housing in a 100-year flood hazard area.

The placement and maintaining of trees would not introduce features that would impede or redirect flood flows and trees would not be placed in areas that would increase the exposure of people to impacts related to the failure of a dam or levee, seiche, tsunami, or mudflow. Therefore, no impact would occur.

c. Protocol Mitigation

Mitigation is not warranted.

12. Land Use and Planning

a. Impacts Related to Conflicts with Relevant Plans or Policies

Under the Urban Forest Offset Protocol, trees would be installed and maintained in existing urban areas, parks, street parkways, or other urban open spaces. Planning tools for implementing urban forest offset projects would likely include tree preservation and planting ordinances, or modifications to development guidelines or regulations for the purpose of preserving and planting more trees. Therefore, the protocol would not result in any conflicts with relevant plans or policies of agencies with jurisdiction over the projects and no impact would occur.

b. Impacts Related to the Division of an Established Community

It is not anticipated that the installation and maintenance of trees in existing urban areas, parks, or other urban open spaces would divide an existing community or conflict with any applicable land use plan. Instead, the Urban Forest Offset Protocol would likely enhance existing land uses by creating a more visually pleasing and shaded environment in urban areas and parks. Therefore, the Urban Forest Offset Protocol is anticipated to have a less than significant impact on land use.

c. Protocol Mitigation

Mitigation is not warranted.

13. Noise

a. Impacts Related to Generation of Noise in Excess of Applicable Standards, Exposure of Sensitive Receptors to Excessive Groundborne Vibration, and Substantial Increases in Ambient Noise Levels

Construction-Related Impacts

Construction-related activities associated with urban forest offset projects would involve the installation and maintenance of trees in urban areas, parks, or other urban open space areas. Equipment associated with tree installation would likely be minimal (e.g., fewer than five pieces per tree site) and mostly non-motorized (e.g., hand equipment that would not generate noise or vibration). In addition, installation at each tree site would likely be completed in less than one day; and would occur in urban areas where existing ambient noise level are already relatively high during the less sensitive daytime hours. Thus, implementation of the Urban Forest Offset Protocol would not generate short-term construction noise (or vibration) levels in excess of applicable standards or that result in a substantial increase in ambient levels at nearby sensitive receptors. As a result, this impact would be less than significant.

Operational Impacts

Operational-related activities associated with urban forest offset projects would involve landscape maintenance (e.g., inspection, trimming, and tree care). These activities would be minimal and not anticipated to result in a doubling of ADT volumes on affected roadway segments (e.g., the amount associated with a substantial traffic noise increase as discussed above). In addition, these activities would require minimal equipment that would mostly be non-motorized, and would occur in urban areas where existing ambient noise levels are already relatively high and during the less sensitive daytime hours. Thus, implementation of the Urban Forest Offset Protocol would not generate long-term operational noise (or vibration) levels in excess of applicable standards or that result in a substantial increase in ambient levels at nearby sensitive receptors. As a result, this impact would be less than significant.

b. Impacts Related to Exposure of People Residing or Working in the Area to Excessive Airport-Related Noise Levels

Because the Urban Forest Offset Protocol would not require any new land use types for which people would reside, any new locations where people would work, or any new airport locations or a substantial increase in airport-activities, implementation would not expose people residing or working in the project area to excessive airport-related noise levels. As a result, this impact would be less than significant.

c. Protocol Mitigation

Mitigation is not warranted.

14. Employment, Population, and Housing

a. Impacts Related to Displacement of Housing or People and Substantial Inducement of Population Growth

It is not anticipated that substantial new permanent employment opportunities would be created by implementation of the Urban Forest Offset Protocol, because urban trees require the same type of maintenance as other managed urban landscapes and would likely be folded into existing landscaping and maintenance operations of the eligible

entity and conducted by existing landscape maintenance personnel. Consequently, implementation of urban forest offset projects under the Urban Forest Offset Protocol would not generate substantial employment opportunities. Further, no new housing would be constructed. Therefore, impacts related to employment, population, and housing from implementation of the Urban Forest Offset Protocol would be less than significant.

b. Protocol Mitigation

Mitigation is not warranted.

15. Public Services

a. Impacts Related to the Provision of Public Services (Fire Protection, Police Protection, Schools, and Parks)

Typical landscape maintenance activities (e.g., inspection, trimming, and tree care) under for urban forest offset projects would be required and would be incorporated into the proposed offset project implementation. Urban forest offset projects could only occur in the United States and would be required to be implemented by an eligible entity (i.e., municipality, educational campus, utility). The eligible entities are defined in part because they have existing capabilities and responsibilities for management of their properties and landscapes. Also, the projects would be located in existing urban communities on small properties, which would be located within existing urban services areas. It is not anticipated that substantial new permanent employment opportunities would be created by implementation of this offset protocol, because the maintenance of urban trees require the same type of maintenance as other managed landscapes and would likely be folded into existing landscaping and maintenance operations of the approved entity and conducted by existing landscape maintenance personnel. Consequently, implementation of Urban Forest Offset Protocol would not generate substantial demand for public services. Therefore, impacts to public services from the implementation of the Urban Forest Project Protocol would be less than significant.

b. Protocol Mitigation

Mitigation is not warranted.

16. Recreation

a. Impacts to Recreational Facilities

It is expected that implementation of projects under the Urban Forest Offset Protocol would enhance recreational areas by adding trees and shaded areas in parks and/or the surrounding vicinity. This would be a beneficial impact. While tree installation activities and could result in disruption of recreational opportunities and/or uses, these activities would be temporary and would cease once the trees are planted. Typical landscape maintenance activities would be ongoing, but would not be substantially different from other existing urban landscapes. It is not anticipated that implementation of urban forest projects would increase the use of recreational areas such that physical

deterioration of the area or facility would occur or be accelerated. Therefore, implementation of the Urban Forest Offset Protocol this would result in a less than significant impact to recreation facilities.

b. Protocol Mitigation

Mitigation is not warranted.

17. Transportation and Traffic

a. Impacts to Surrounding Roadways, Conflicts with Congestion Management Programs, Changes in Air Traffic Patterns, Adequate Emergency Access, or Conflicts with Adopted Policies, Plans, or Programs Regarding Public Transit, Bicycle, or Pedestrian Facilities

Construction Impacts

Construction-related activities associated with urban forest offset projects would involve the installation of trees in urban areas, parks, or other urban open space areas. Equipment associated with tree installation would likely be minimal (e.g., fewer than five pieces per tree site) and mostly non-motorized (e.g., hand equipment that would not generate off-site traffic). In addition, installation at each tree site would likely be completed in less than one day. Thus, implementation of the Urban Forest Offset Protocol would not generate short-term construction traffic that would conflict with applicable programs, plans, ordinances, or policies; result in a change in air traffic patterns; substantially increase hazards due to design features; or result in inadequate emergency access. As a result, this impact would be less than significant.

Operational Impacts

Operational-related activities associated with urban forest offset projects would involve landscape maintenance (e.g., inspection, trimming, and tree care). These activities would be minimal and infrequent such that they would not be anticipated to substantially increase traffic volumes on local roadways. This would be a less than significant impact.

Implementation of projects under the Urban Forest Offset Protocol would not result in the construction of any new housing or office buildings. Therefore, implementation of the protocol would not generate long-term operational traffic that would conflict with applicable programs, plans, ordinances, or policies, including policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities; result in a change in air traffic patterns; substantially increase hazards due to design features; or result in inadequate emergency access. No impact would occur.

b. Protocol Mitigation

Mitigation is not warranted.

18. Utilities and Service Systems

a. Wastewater Services, Stormwater Facilities, Water Demand and Supply, Landfill Capacity, and Solid Waste Regulation

Implementation of urban forest offset projects under the Urban Forest Offset Protocol would not generate substantial demand for electricity, natural gas, water or wastewater services above and beyond what could be provided by existing service providers and resources because these projects would generally would be small, would not involve new facilities, would be incorporated within existing landscaping maintenance programs of qualified entities such that they would not substantially increase demands above service levels that could be provided. This would be a less than significant impact.

Urban forest offset projects implemented under the Urban Forest Offset Protocol would include maintenance activities (e.g., tree pruning, removal of dead or diseased trees) that could result in additional wood and trimmings that may need to be hauled to local solid waste and composting facilities. However, it is anticipated that trimmings and removed trees would be minimal and that some or most of the material would be recycled into mulch. This would be a less than significant impact.

b. Protocol Mitigation

Mitigation is not warranted.

19. Indirect Impacts of the Protocol

No indirect impacts of the Urban Forest Offset Protocol have been identified.

20. Summary of Impacts and Mitigation Measures

The significance determinations identified below reflect the programmatic nature of the analysis of the reasonably foreseeable methods of compliance with the cap-and-trade regulation. Because of this, the FED analysis addresses broadly defined types of impacts without the ability to determine the specific project locations, facility size, character, or site-specific environmental characteristic affected. As a result impact issues may be determined to be potentially significant because of the inherent uncertainties about the relationship between future projects and environmentally sensitive resources or conditions. This is a conservative approach (i.e., tending to overstate environmental impacts), in light of these uncertainties, to satisfy the good-faith, full disclosure purpose of CEQA. When specific projects are proposed and subjected to project-level environmental review, it is expected that many of the impacts identified as potentially significant can be avoided or maintained at a less than significant level.

Another inherent uncertainty in the FED analysis is the degree of implementation of mitigation for potentially significant impacts. While ARB is responsible for adopting the cap-and-trade regulation and implementing the program, it does not have the authority over the proposal, approval or implementation of project or location-specific actions or

offset projects. Additionally, federal agencies must approve projects and require mitigation where federal permits are needed for specific environmental resource impacts, such as take of endangered species or filling of wetlands.

Because ARB is not responsible for implementation of project-specific mitigation and the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, whether potentially significant environmental impacts may be unavoidable.

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a. Summary Impact Matrix for the Urban Forest Offset Protocol

Urban Forest Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Aesthetics			
1. Scenic Vistas, Scenic Resources, Visual Character, Light and Glare	Less than Significant	Mitigation is not warranted	Less than Significant
Agricultural and Forest Resources			
1. Conversion of Farmland to Non-Farmland Uses, Conflicts with Existing Zoning, Conflicts with Williamson Act Contracts	Less than Significant	Mitigation is not warranted	Less than Significant
2. Conflict with Forest Land or Timberland Zoning, Loss or Conversion of Forest Land to Non-Forest Uses	Less than Significant	Mitigation is not warranted	Less than Significant
Air Quality			
1. Conflicts with Adopted Air Quality Plan, Violate Air Quality Standards, Cumulatively Significant Increases in Criteria Pollutants	Less than Significant	Mitigation is not warranted	Less than Significant
2. Odors	Less than Significant	Mitigation is not warranted	Less than Significant

Urban Forest Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Biological Resources			
1. Special-Status Species and Habitat Impacts, Impacts on Wetlands, Interfere with Movement of Native or Migratory Fish	Less than Significant	Mitigation is not warranted	Less than Significant
2. Conflicts with Tree Preservation Policies, Habitat Conservation Plans, or Natural Community Conservation Plans	No Impact	Mitigation is not warranted	No Impact
Cultural Resources			
1. Impacts to Archaeological Resources, Historic Resources, Paleontological Resources, or Undocumented Human Remains	Potentially Significant	• Proponents of urban forest offset projects will coordinate with local land use agencies to seek entitlements for development of the projects including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA). The local land use agency or governing body will certify that the environmental documents are prepared in compliance with applicable regulations and will approve the projects for development. • The local land use agency will implement all mitigation identified in the environmental documents to reduce or substantially lessen the environmental impacts of the projects. • The local land use agency will retain the services of cultural resources specialists with training and background that conforms to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61 (36 CFR Part 61). • The local land use agency will seek guidance from the State Historic Preservation Officer and federal lead agencies, as appropriate, for coordination of	Significant and Unavoidable

Urban Forest Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
		Nation-to-Nation consultations with the Native American Tribes. • Proponents of the urban forest offset projects will consult with lead agencies early in the planning process to identify the potential presence of cultural properties. The agencies will provide the project developers with specific instruction on policies for compliance with the various laws and regulations governing cultural resources management, including coordination with regulatory agencies and Native American Tribes. • Proponents of the urban forest offset projects will define the area of potential effect (APE) for each project, which is the area within which project construction and operation may directly or indirectly cause alterations in the character or use of historic properties. The APE shall include a reasonable construction buffer zone and laydown areas, access roads, and borrow areas, as well as a reasonable assessment of areas subject to effects from visual, auditory, or atmospheric impacts, or impacts from increased access. • Where disturbance of paleontological resources is likely, proponents of the urban forest offset projects will retain the services of a paleontological resources specialist with training and background that conforms with the minimum qualifications for a vertebrate paleontologist as described in Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontologic Resources: Standard Procedures, Society of Vertebrate Paleontology, 1995 http://www.vertpaleo.org/society/polstateconfomimpactmigig.cfm. • Proponents of the urban forest offset projects will conduct initial scoping assessments to determine whether proposed construction activities, if any,	

Urban Forest Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
		could disturb formations that may contain important paleontological resources. Whenever possible potential impacts to paleontological resources should be avoided by moving the site of construction or removing or reducing the need for surface disturbance. The scoping assessment will be conducted by the qualified paleontological resources specialist in accordance with applicable agency requirements. • If the scoping assessment indicates that resources may be disturbed, the project proponent's qualified paleontological resources specialist will determine whether paleontological resources would likely be disturbed in a project area on the basis of the sedimentary context of the area and a records search for past paleontological finds in the area. The assessment may suggest areas of high known potential for containing resources. If the assessment is inconclusive a surface survey is recommended to determine the fossilferous potential and extent of the pertinent sedimentary units within the project site. If the site contains areas of high potential for significant paleontological resources and avoidance is not possible, prepare a paleontological resources management and mitigation plan that addresses the following steps: a) a preliminary survey (if not conducted earlier) and surface salvage prior to construction; b) physical and administrative protective measures and protocols such as halting work, to be implemented in the event of fossil discoveries; c) monitoring and salvage during excavation; d) specimen preparation; e) identification, cataloging, curation and storage;	

Urban Forest Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
		and f) a final report of the findings and their significance. g) Choose sites that avoid areas of special scientific value. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the compliance response projects and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce this impact, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less than significant level. Therefore, for purposes of this analysis, impacts to cultural resources from the Urban Forest Offset Protocol would be significant and unavoidable.	
Energy Demand			
1. Impacts to Energy Resources	Less than Significant	Mitigation is not warranted	Less than Significant
Geology, Soils, and Minerals			
1. Seismic Impacts	Less than Significant	Mitigation is not warranted	Less than Significant
2. Unstable Soils Impacts, Expansive Soils Impacts	Less than Significant	Mitigation is not warranted	Less than Significant
3. Impacts to Mineral Resources	Less than Significant	Mitigation is not warranted	Less than Significant
Greenhouse Gases			

Urban Forest Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
1. Generate Significant Greenhouse Gas Emissions or Conflict with Applicable Greenhouse Gas Plan	Beneficial Impact	Mitigation is not warranted	Beneficial Impact
Hazards and Hazardous Materials			
1. Impacts Related to the Routine Disposal and Transport of Hazardous Materials	Less than Significant	Mitigation is not warranted	Less than Significant
2. Impacts Related to the Release of Hazardous Materials to the Environment or Near Schools	Less than Significant	Mitigation is not warranted	Less than Significant
3. Impacts Related to Creating a Significant Hazard to the Public or the Environment	Less than Significant	Mitigation is not warranted	Less than Significant
4. Impacts Related to Creating Conflicts with Emergency Response Plan or Exposure of People to Increase Wildland Fire Risks	Less than Significant	Mitigation is not warranted	Less than Significant
5. Impacts Related to Creation of Hazards Near Airports	Less than Significant	Mitigation is not warranted	Less than Significant
Hydrology, Water Quality and Water Supply			
1. Impacts Related to Violation of Existing Water Quality Standards and Waste Discharge Requirements, Depletion of Groundwater, Alteration of Existing Drainage, Degradation of Water Quality, and Exceedance of the Capacity of Existing Stormwater Systems	Less than Significant	Mitigation is not warranted	Less than Significant

Urban Forest Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
2. Impacts Related to Placement of Housing in a 100-year Flood Hazard Area, Redirecting Flood Flows, Exposure of People to Flooding from Levee or Dam Failure, or Inundation by Seiche, Tsunami, or Mudflow	Less than Significant	Mitigation is not warranted	Less than Significant
Land Use			
1. Impacts Related to Conflicts with Relevant Plans or Policies	Less than Significant	Mitigation is not warranted	Less than Significant
2. Impacts Related to the Division of an Established Community	Less than Significant	Mitigation is not warranted	Less than Significant
Noise			
1. Impacts Related to Generation of Noise in Excess of Applicable Standards, Exposure of Sensitive Receptors to Excessive Groundborne Vibration, and Substantial Increases in Ambient Noise Levels	Less than Significant	Mitigation is not warranted	Less than Significant
2. Impacts Related to Exposure of People Residing or Working in the Area to Excessive Airport-Related Noise Levels	Less than Significant	Mitigation is not warranted	Less than Significant
Employment, Population, and Housing			
1. Impacts Related to Displacement of Housing or People and Substantial Inducement of Population Growth	Less than Significant	Mitigation is not warranted	Less than Significant

Urban Forest Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Public Services			
1. Impacts Related to the Provision of Public Services (Fire Protection, Police Protection, Schools, and Parks)	Less than Significant	Mitigation is not warranted	Less than Significant
Recreation			
1. Impacts to Recreational Facilities	Less than Significant	Mitigation is not warranted	Less than Significant
Transportation and Traffic			
1. Impacts to Surrounding Roadways, Conflicts with Congestion Management Programs, Changes in Air Traffic Patterns, Adequate Emergency Access, or Conflicts with Adopted Policies, Plans, or Programs Regarding Public Transit, Bicycle, or Pedestrian Facilities	Less than Significant	Mitigation is not warranted	Less than Significant
Utilities and Service Systems			
1. Wastewater Services, Stormwater Facilities, Water Demand and Supply, Landfill Capacity, and Solid Waste Regulation	Less than Significant	Mitigation is not warranted	Less than Significant

F. Compliance Offset Protocol for Forest Projects

1. Forest Offset Protocol Description and Compliance Responses

Forests have the capacity to both emit and sequester CO_2, a leading GHG that contributes to climate change. Trees, through the process of photosynthesis, naturally absorb CO_2 from the atmosphere and store the gas as carbon in their biomass, i.e., trunk (bole), leaves, branches, and roots. Carbon is also stored in the soils that support the forest, as well as the understory plants and litter on the forest floor. Wood products that are harvested from forests can also provide long term storage of carbon.

When trees are disturbed, through events like fire, disease, pests or harvest, some of their stored carbon may oxidize or decay over time releasing CO_2 into the atmosphere. The quantity and rate of CO_2 that is emitted may vary, depending on the particular circumstances of the disturbance. Forests function as reservoirs in storing CO_2. Depending on how forests are managed or affected by natural events, they can be either a net source of emissions (resulting in a decrease to the reservoir) or a net sink (resulting in an increase to the reservoir). In other words, forests may have a net negative or net positive impact on the climate.

a. Forest Offset Protocol Description

Forest Project Types

Under the Compliance Offset Protocol for Forest Projects (Forest Offset Protocol), a forest project is defined as a planned set of activities designed to increase removal of CO_2 from the atmosphere, or reduce or prevent emissions of CO_2 to the atmosphere, through increasing and/or conserving forest carbon stocks. Three types of forest projects are included in the Forest Offset Protocol: reforestation, improved forest management, and avoided conversion. All forest projects must occur within the U.S. Improved forest management projects, one of the types of forest offset projects described below, must occur in the U.S., excluding Alaska and Hawaii.

Reforestation projects involve planting trees or removing impediments to natural regeneration on land that was historically forested and has been out of forest cover for at least 10 years, or has been subject to a recent significant disturbance. The project areas are not expected to be at optimal stocking levels and have minimal short-term commercial timber harvest opportunities. Projects must meet several eligibility requirements including: having had less than 10 percent tree canopy cover for a minimum of 10 years or been subject to a natural disturbance that removed at least 20 percent of the live biomass above ground; no harvesting of trees during the first 30 years of the project except to control disease; no commercial harvesting within the past 10 years; no use of broadcast fertilization; and having not been part of a previously registered project, unless an unavoidable reversal occurred. Reforestation projects may be eligible on both private and public lands.

Improved forest management projects include management activities that would maintain or increase carbon stocks on forested land relative to baseline levels. They also include incentives to place older growth, high stocked areas into projects, resulting in the long-term protection of these forests and their associated ecosystem co-benefits.

An improved forest management project is only eligible if the project: takes place on land that has greater than 10 percent tree canopy cover; employs natural forest management; does not use broadcast fertilization; and was not part of a previously registered project, unless an unavoidable reversal occurred. Eligible management activities may include, but are not limited to: increasing the overall age of the forest by increasing rotation ages; increasing the forest productivity by thinning diseased and suppressed trees; managing competing brush and short-lived forest species; increasing the stocking of trees on understocked areas; and maintaining stocks at a high level. Improved forest management projects may be eligible on both private and public lands.

Avoided conversion would involve preventing the conversion of forest lands (including oak woodlands) to a non-forest use by dedicating the land to continuous forest cover through conservation easement or transfer to public ownership. An avoided conversion project is only eligible if: there is a significant threat of conversion of project land to a non-forest land use by following the requirements for establishing the project's baseline; the project does not employ broadcast fertilization; and the project does not take place on land that was part of a previously registered forest project, unless it was terminated due to an unavoidable reversal. Avoided conversion projects are eligible only on lands that are privately owned prior to offset project commencement. An avoided conversion project may involve tree planting and harvesting as part of the project activity.

All projects are required to employ both sustainable harvesting practices and natural forest management practices, as described below. Other eligibility requirements are provided in the Forest Offset Protocol in Chapter II of the ISOR.

Sustainable Harvesting Practices

At the time commercial harvesting is either planned or initiated within the project area, the forest owner must employ and demonstrate sustainable long-term harvesting practices on all of its forest landholdings including the project area, using one of the following options:

1. The forest owner must be certified under the Forest Stewardship Council, Sustainable Forestry Initiative, or Tree Farm System certification programs. Regardless of the program, the terms of certification must require adherence to and verification of harvest levels which can be permanently sustained over time.

2. The forest owner must adhere to a renewable long-term management plan that demonstrates harvest levels which can be permanently sustained over time and that is sanctioned and monitored by a state or federal agency.

3. The forest owner must employ uneven-aged silvicultural practices and must maintain canopy cover averaging at least 40 percent across the entire forestland owned by the forest owner in the same assessment areas covered by the project area, as measured on any 20 acres within the forest owner's landholdings found in any of these assessment areas, including land within and outside of the project area (areas impacted by significant disturbance may be excluded from this test).

Forest owners who acquire new forest landholdings within their entity have up to 5 years to incorporate such acquisitions under their certification or management plan, whether or not such land is contiguous with the project area.

Natural Forest Management Practices

All forest projects must promote and maintain a diversity of native species and use management practices that promote and maintain native forests comprised of multiple ages and mixed native species within the project area and at multiple landscape scales. For the purposes of the Forest Offset Protocol, this is termed "Natural Forest Management".

The following key requirements shall apply to all forest projects regardless of the silvicultural or regeneration methods that are used to manage or maintain the forest:

1. Forest projects must maintain or increase standing live carbon stocks over the project life, where project life is defined as the period of time between offset project commencement and a period of 100 years following the issuance of any compliance offset credit for GHG reductions or removals achieved by the project.

2. Forest projects must show verified progress (verified at scheduled site-visits) towards native tree species composition and distribution consistent with the forest type and forest soils native to the assessment area.

3. Forest projects must manage the distribution of habitat/age classes and structural elements to support functional habitat for local native plant and wildlife species naturally occurring in the project area, as specified in the Forest Offset Protocol in Chapter II of the ISOR. Some of these criteria include retaining standing and lying dead wood; limiting even-aged management harvests (e.g., clear cuts) to stands no greater than 40 acres; stands adjacent to recently harvested (even-age) stands must not be harvested using an even-aged regeneration harvest until a recent even-aged regeneration harvested stand is 5-years old, or the average height of the regeneration in the recently harvested stand has achieved a height of 5 feet; and on a watershed scale of up to 10,000 acres, all projects must maintain or make progress toward maintaining no more than 40 percent of their forested acres in ages less than 20 years.

Forest projects that initially engage in natural forest management must continue to do so for as long as monitoring and verification of the forest projects are required by the Forest Offset Protocol. Forest projects that do not initially meet natural forest

management criteria, but can demonstrate progress towards meeting them under the conditions identified in the Forest Offset Protocol, are eligible to register for the project for potential offset credit. Progress toward meeting the criteria is assessed during project verification.

Estimating the Carbon Stock Baseline

Active, eligible forest projects must demonstrate a net reduction in CO_2 from the atmosphere over time. The ability of a forest project to meet the goals of additionality are measured against the baseline condition, which is the level of GHG emissions, removals, and/or carbon stocks at sources, sinks, or reservoirs affected by the forest project that would have occurred under a Business-As-Usual scenario. The Forest Offset Protocol requires that credited GHG reductions or removals be additional to any reductions or removals required by law or regulation, or that would otherwise occur under a conservative Business-As-Usual scenario. The Forest Offset Protocol specifies a legal-requirement test and a performance test for each project type that are used to determine project eligibility and set the project baseline for crediting.

A project's baseline must be estimated following standard procedures that include modeling 100 years of carbon stock changes, using forecasts of harvesting that would have occurred under Business As Usual. ARB's compliance Forest Offset Protocol baseline calculation approach for improved forest management projects includes safeguards to prevent enrolling of unusually understocked forest land, when compared to other holdings of the land owner, and common practice on other forest lands within the same assessment area as the project. It also includes recognition of habitat conservation plans as legal constraints on determining baseline. Details about the quantification process are provided in the Forest Offset Protocol, Chapter II of the ISOR.

Project Crediting Period and Time Commitment

Verified forest projects that meet the requirements of the Forest Offset Protocol would be eligible to generate offset credits for a crediting period of 25 years. There is no limit to the number of renewals of a crediting period; however, each project is required to move to the latest version of the relevant protocol at the end of the crediting period as a condition of renewal.

Forest project life is defined as the period of time between offset project commencement and a period of 100 years following the issuance of any compliance offset credit for GHG reductions or removals achieved by the project. Forest projects must continue to monitor, verify, and report project data for a period of 100 years following any compliance offset credit issuance. For example, if credits are issued to a Forest Project in year 24 following its start date, monitoring, verification, and reporting activities must be maintained until year 124. All forest projects must undergo an initial site-visit verification to be eligible. After the initial verification all forest projects must undergo verification, including a site visit, at least once every six years. The only exception to this rule is for reforestation projects, which may defer a second site-visit verification beyond six years. The third and subsequent site visit verifications for reforestation projects must continue on a six-year cycle.

There are three possible exceptions to this minimum time commitment:

1. A forest project automatically terminates if a significant disturbance occurs leading to an unintentional reversal that reduces the project's standing live tree carbon stocks below the project's baseline standing live tree carbon stocks. A significant disturbance is defined as any natural impact that results in a loss of least 20 percent of the above-ground live biomass that is not the result of intentional or grossly negligent acts of the forest owner (e.g., wildfire).

2. A forest project automatically terminates if project lands are sold to an entity that does not elect to take over project responsibilities and commitments as specified in procedures outlined in ARBs Forest Offset Protocol.

3. A forest project may be voluntarily terminated prior to the end of its minimum time commitment if the required quantity of compliance offset credits or allowances are retired, as specified in procedures outlined in ARBs Forest Offset Protocol.

Carbon Stocks in Forests and Wood Products

Forests are biological systems that continually gain and lose carbon via processes such as photosynthesis, respiration, decomposition, and combustion; whether forests show a net gain or loss of carbon depends on the balance of these processes. While the ecological processes of photosynthesis, respiration, and decomposition are similar for all forests, their relative importance differs by forest type and location. Some forests grow more rapidly, but dead trees in fast-growing forests also generally decompose more rapidly. In addition, disturbances vary regionally. For example, fire disturbance is more common in the western U.S. and hurricanes more common in the east. Forests are managed in different ways with varying harvest intervals and regeneration practices that will influence the optimum strategy for storing more carbon. Each forest has a different potential to store carbon. For example, this potential is particularly high in the Pacific Northwest where forests are relatively productive, trees live a long time, decomposition is relatively slow, and fires are infrequent. The differences between forests must therefore be taken into consideration when determining how they should be managed to store carbon (Ryan et al. 2010, p. 4).

Carbon accumulation in forests parallels woody biomass growth. Tree growth curves are generally S-shaped when viewed on a graph, with slow accumulation when trees are young, increasing as the trees mature, and then slowing as the tree reaches senescence. There are substantial variations and uncertainties in the exact rates of growth over the life of the tree, depending on species, locations, environmental conditions, stressors, and other factors. Carbon accumulation in sapling and young trees is low, and increases when trees mature and reach their full size; whether carbon accumulation continues or peaks in "old-growth" trees when net additional wood growth is minimal is disputed. The rate of growth undoubtedly varies among tree species and locations; for example, the culmination of mean annual increment occurs at about 20 years on many Southern pine sites, but may be at 60 years or more for many Douglas fir sites on the Pacific Coast (Congressional Research Service 2009, pp. 4-5). A recent

study has demonstrated that passive management sequesters more carbon than active management, and that management practices favoring lower harvesting frequencies and higher structural retention sequester more carbon than intensive forest management (Nunery and Keeton 2010, p. 1372). Some studies have demonstrated little differences between the rates of carbon sequestration of even-aged and multi-aged stands (O'Hara and Nagel 2006, p. 300; CEC 2004, p.30), whereas some studies have shown uneven-aged management forests with group selection harvesting increased the total carbon storage over even-aged management with clear-cuts (CEC 2004, p. 54).

Furthermore, results of modeling time, simulating growth, mortality, and harvesting for several California forest types and site classes indicate that conversion of complex multi-species forests to single-species, single-aged plantations are unlikely to greatly increase the amount of carbon removed from the atmosphere using the Forest Offset Protocol (Robards, 2010, pg. 7-8). Under these scenarios, although there may be a temporary increase in creditable carbon, it would be difficult to perpetuate a short rotation strategy that would continue to increase carbon sequestered over the project's life. If a multi-aged stand is converted to an even-age plantation, it would need to be allowed to mature to offset the on-site carbon losses that occurred during conversion, such as carbon released during harvesting, transport, and wood processing (Robards, 2010, pg. 8). Retaining trees on land converted to a plantation beyond their time of marketability as wood products would be economically disadvantageous (because of the higher economic value of wood products compared to carbon offset credits), so conversion and long-term maturation of a plantation would not be a reasonably expected outcome of the Forest Offset Protocol. Net carbon sequestration rate is dependent on many factors related to both site conditions and life-cycle considerations, such as forest type, site location, harvesting interval, and harvesting and management methods (Ryan et al. 2010, p.7; Nunery and Keeton 2010, p. 1363).

It is expected that management of stands registered as forest offset projects would be designed to maximize growth (and carbon sequestration) and that trees would be periodically harvested when the growth rate begins to decline or that other silvicultural practices, such as thinning would be used to increase resistance to wildfire, insect or disease risks, or to balance age classes. However, for projects to remain eligible to participate in the protocol, they need to demonstrate a continued net reduction in carbon from the atmosphere over the life of the project. Any harvesting or other management activities that could result in GHG emissions would need to ensure that the project's inventory of carbon in standing live trees does not fall below the project's baseline or 20 percent less than the project's standing live carbon stocks at the project's initiation, whichever is higher. The protocol recognizes that carbon inventories in forests may fluctuate over time. Except under specified circumstances, if a project's standing live carbon stocks decrease over any 10-year consecutive period, the project will be out of conformance and will be unable to generate offset credits. Exceptions to this policy are allowed where reductions in standing live carbon stocks are important for maintaining and enhancing forest health, environmental co-benefits, or the long-term security of all carbon stocks; where reductions are due to non-harvest disturbances; or where reductions are required by law. These parameters would not encourage timber harvest

that would lead to reduced carbon stocks or conversion of multi-aged forests to plantations, because these actions would work against the requirements for continual increase in carbon sequestration over the life of the forest offset project. More details about requirements to maintain carbon stocks over the life of the project and compensate for reversals are provided in the Forest Offset Protocol, Chapter II of the ISOR.

Although wood products store carbon, simulations under several scenarios indicate that, in general, the long-term carbon storage in wood products does not offset the GHG emissions released by the harvesting, transport, and processing of the products. In addition to the emissions from the harvesting and transport equipment, carbon is released from the un-marketable portions of the tree (i.e., decomposition, burning, or disposal of small limbs, branches, leaves, and roots). These un-marketable portions typically comprise more than half of the biomass of the tree (Robards, 2010, p. 7). Modeling simulations of several California forest types and site classes indicate that it would be infeasible for projects to derive the majority of creditable carbon from wood products, both early in the project's planning horizon and over the life of a project (Robards, 2010, p. 7). While the Forest Offset Protocol anticipates that harvesting and storage of carbon in wood products would occur and provides an accounting method to estimate carbon reduction in wood products, more carbon would be sequestered in standing, live trees. Therefore, it is expected that the interval between timber harvests would be greater in forests managed for carbon sequestration than in forests managed for timber production alone in order for projects to meet the goal of maintaining or increasing carbon stocks over the project life.

In summary, the Forest Offset Protocol is not expected to provide an incentive for more frequent timber harvests or larger areas of timber harvest, because of requirements to maintain or increase carbon stocks over time. Also, the GHG emissions that would occur during harvest, transport and processing would not be offset by carbon storage in wood products. The Forest Offset Protocol is also not expected to increase the size of even-aged harvested areas or to result in plantation forests due to requirements of the projects to follow sustainable management and natural forest management practices.

Project Locations and Regulatory Compliance

Under the proposed protocol, forest projects may occur throughout the U.S. Improved forest management projects, one of the forest offset projects allowed under the protocol, must be located in the U.S., excluding Alaska and Hawaii. Each time a forest project is verified, the forest owner must attest that the project is in compliance with all applicable laws relevant to the project activity. Forest owners are required to disclose in writing to the verifier any and all instances of material non-compliance of the project with any law. Timber harvests on private land in California would be subject to California Forest Practice Rules. Commercial timber companies with landholdings of a qualifying size (at least 2,500 acres) are required to prepare a Timber Harvest Plan (which is a part of a certified regulatory program that includes a CEQA-equivalent environmental document). Non-commercial Timber Management Plans can be used if an owner has less than 2,500 acres and is not in the business of manufacturing forest products. In those cases,

the owner must choose to use uneven-aged management methods (i.e., selectively harvesting trees) and must plan for sustained yield over time. Timber harvests on federal land would not be eligible. In areas where CEQA or NEPA does not apply, it is unknown if comparable, effective environmental review processes exist that would appropriately consider and minimize the impacts of proposed forest offset projects.

At this time, the specific location, type, and number of forest projects that would occur under the Forest Offset Protocol in-state and out-of-state cannot be known and would be dependent upon a variety of factors that are not within the control of ARB including: cost, offset demands, environmental constraints, and other market constraints. Nonetheless, the analysis presented herein reflects a reasonable, good-faith effort to describe the types of impacts that could occur with implementation of forest projects under the Forest Offset Protocol.

Adaptive Management

The design of the Forest Offset Protocol includes several elements intended to support protection of other ecosystem functions of the forest, such as adherence to sustainable harvesting and natural forest management practices, requirements to demonstrate increased carbon stocks over the life of a project, and compliance with all applicable Federal, State, and local laws and regulations. Nonetheless, ARB recognizes that unanticipated, potentially significant impacts could occur over the life a forest offset project (as discussed below). Because of this recognition about the potential for unanticipated adverse impacts on forest resources, ARB is committed to using an adaptive management process to review and revise policies and procedures as more information becomes available. Adaptive management is a process that promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Refer to Section 2.E for a description of the adaptive management approach.

b. Forest Offset Protocol Compliance Responses

Under the Forest Offset Protocol, it is expected that the following reasonably foreseeable compliance responses would occur: reforestation, forest management projects, and forest protection (avoided conversion) projects would be implemented. The reasonably foreseeable compliance responses that would occur under each of these project types are described below:

Reforestation

- New trees would be planted within appropriate, degraded existing or former forest areas to increase tree canopy coverage and carbon sequestration.

- Areas will be cleared of debris or other forest products to allow for natural reforestation processes to occur.

- Installation activities would include the delivery of tree seeds or seedling trees to the project area, hauling of soil and other planting materials, use of small

construction equipment (e.g., small generators, post-hole diggers, etc.), and transport of construction workers to and from the site.

- For both installation and maintenance, application of herbicides in a manner consistent with their label requirements would be expected to control competing species.

- Tree maintenance activities would include periodic transport of maintenance personnel and equipment, use of small hand tools to trim and maintain trees (e.g., chainsaw, trimmers, etc.). Broadcast fertilization would not occur. Some harvesting of dead, diseased, or dying trees would occur; however, these trees would be replaced, so that there is a net gain in GHG emission reductions.

- Monitoring activities would include the periodic survey of the project area by small 2-4 person crews. Mandatory monitoring and verification would occur every six years, with optional verification occurring on a more frequent basis.

Improved Forest Management

- Management activities would include the periodic rotation (harvest and re-planting) of trees to increase the age of the forest and its carbon sequestration potential. Tree harvesting could produce marketable timber. Productivity of carbon sequestration would increase through the periodic thinning of diseased and distressed trees. Competing brush and short-lived forest species would be removed where necessary to increase carbon stocks and trees would be planted in understocked areas, but in a manner that is still consistent with fire fuel management objectives for the project area.

- Forest management activities would be subject to local, state, and federal requirements and permits as appropriate to each project area.

- Installation activities would include the delivery of trees to the project area, hauling of soil and other planting materials, use of small construction equipment (e.g., small generators, post-hole diggers, etc.), and transport of construction workers to and from the site.

- Tree maintenance activities would include periodic transport of maintenance personnel and equipment, use of small hand tools to trim and maintain trees (e.g., chainsaw, trimmers, etc.). Broadcast fertilization would not occur. Some harvesting of dead, diseased, or dying trees would occur and would be hauled off the project site.

- Monitoring activities would include the periodic survey of the project area by small 2-4 person crews. Mandatory verification would occur every six years, with optional verification occurring on a more frequent basis.

Avoided Conversion

- Legal agreements would be entered into to permanently conserve existing forest areas (qualified conservation easement or transfer to public ownership).

- Projects do not prevent any harvesting, but rather allow forest lands to continue to be managed as forests rather than converted to an alternative land use. Management of the forest lands may reflect a wide variety of different management objectives, provided that the projects adhere to all protocol requirements for natural forest management and sustainable harvesting.

- Monitoring activities would include the periodic survey of the project area by small 2-4 person crews. Mandatory monitoring and verification would occur every six years, with optional verification occurring on a more frequent basis.

c. Protocol Impacts and Mitigation

The impacts of implementing the Forest Offset Protocol on each environmental resource area are described below.

2. Aesthetics

a. Scenic Vistas, Scenic Resources, Visual Character, Light and Glare

Reforestation and avoided conversion projects would be expected to result in long-term beneficial effects on scenic resources as the activity would result in increased tree cover in previously disturbed areas or protection of the forest in perpetuity. Views of sites subject to reforestation may temporarily include staging areas, vehicles and equipment, and support materials (e.g., irrigation supplies). However, these views would be short-term, consistent with the visual character of forest management sites and activities, and not unusual or adverse. No substantial adverse impacts on scenic vistas, scenic resources, or visual character would be expected, and no new sources of substantial light or glare would be introduced.

All forest project types are likely to involve regular silvicultural or timber harvest activities that could result in patches of forest where trees have been removed. These activities could result in areas where an unnatural appearance would be created that is out of character with adjacent forested areas, and could be visible from residences, highways and roadways, and recreational areas. While these changes may cause some diminished scenic value in localized areas, the limited acreage and other requirements, such as use of native species and uneven aged management, in the Forest Offset Protocol would serve to minimize or moderate such impacts.

Although scenic impacts may result as described above, they would not be expected to differ substantially from the existing management practices in the project forest. Timber harvesting and forest management are likely to occur on the affected properties regardless of implementation of the Forest Offset Protocol, because the properties would already be subject to forest management in their existing condition. Improved forest management projects would occur on land that is already classified as timber

land and could be subject to periodic timber harvesting under existing market conditions. Moreover, an anticipated compliance response from improved forest management projects is to increase the rotation age (i.e. harvest less frequently), which would tend to decrease aesthetic impacts compared to a baseline of expected existing practice. Timber harvests and/or forest management activities are expected to take place on project sites for reasons that are independent of the Forest Offset Protocol, i.e., the sites contain existing or formerly managed forest, because of their property ownership, land use, and/or location, along with market demands for wood products. Consequently, silviculture activities would occur with or without the inclusion of the protocol in the offset program, so a substantial adverse environmental change resulting from forest offset project activities would not be expected. Therefore, aesthetic impacts from implementation of the Forest Offset Protocol are considered less than significant.

b. Protocol Mitigation

Mitigation is not warranted.

3. Agriculture and Forest Resources

a. Conversion of Agricultural Land or Forest Land or Conflict with Zoning

Reforestation projects could conceivably result in the conversion of agricultural land, including prime, unique, or farmland of statewide importance to non-agricultural uses if a reforestation project occurs on land currently used for agriculture. Generally, reforestation projects would involve restoring land that was traditionally forested, but on which tree coverage has dropped to non-optimal levels or where wildfires or historic logging has occurred. Agricultural land that is fallowed and unproductive may be a eligible candidate for reforestation, but if the land is important farmland that is producing marketable products, it would not be economically advantageous to restore forest on the landscape. Therefore, it is not expected that reforestation projects would be proposed or approved on lands used productively for agriculture or under Williamson Act contract under existing conditions.

Avoided conversion projects would similarly not result in the conversion of agricultural land to non-agricultural uses because avoided conversion projects would prevent land currently used as forestland from being converted to non-forest uses, including land used for agriculture under existing conditions.

Improved forest management would improve existing forested land, and not convert forested land to other uses. Because they would occur in existing forests, no conversion of agricultural lands would be involved.

The potential to conflict with existing agricultural or forest production zoning designations would be less than significant, because existing managed forests would likely already be designated for that use (such as a timber production zone) and productive, agriculturally zoned land would not be expected to experience conversion for reasons stated previously. Consequently, the impact of implementing the Forest

Offset Protocol on agriculture is considered less than significant. Impacts to forest resources are also considered less than significant, because reforestation projects are not expected to conflict with existing zoning for forest land, timberland, or timber production zone or result in conversion of forest to non-forest land or loss of forest land.

b. Protocol Mitigation

Mitigation is not warranted.

4. Air Quality

a. Criteria Air Pollutants and Toxic Air Contaminants

Forest projects could result in a variety of forest management activities that would include the use of workers to plant, trim, cut, and haul away seedlings/trees in designated areas, use of a variety of mobile forestry equipment (e.g., logging trucks, tree saws, tractors, other vehicles), and potentially the establishment of small base camp type facilities (e.g., mobile office buildings, storage buildings) to oversee the reforestation and forest management activities. Under some forest projects, the wood, trimmings, and other slash hauled from the designated forestry sites may be sent to established wood processing facilities, lumber yards, or existing or new biomass power or CHP facilities.

The potential for use of mobile forestry equipment, employment of forest offset project personnel, and forest biomass transport activities could result in emissions of criteria air pollutants and precursors. Reforestation activities could result in emissions that are short-term, construction-like in nature. Other silvicultural activities involving timber harvesting or thinning could result in emissions that are long-term, operational in nature.

Forest projects would occur on land that currently support or historically supported forests. Forested land is typically subject to periodic forest management activities, such as thinning, hazardous fuel removal, replanting, and/or potentially timber harvest, as determined by existing ownership and market conditions. Timber harvests and/or forest management activities are expected to take place on project sites for reasons that are independent of the Forest Offset Protocol, i.e., the sites contain existing or formerly managed forest, because of their property ownership, land use, and/or location, along with market demands for wood products. Consequently, silviculture activities would occur with or without the inclusion of the protocol in the offset program, so a substantial adverse environmental change resulting from forest offset project activities would not be expected. Establishing a forest offset project would not result in the exercise of forest management activities where they could not already occur in some form. Therefore, substantial differences in air pollutant emission generation from current management practices would not be expected and impacts to air quality resulting from implementation of the Forest Offset Protocol would be less than significant.

b. Protocol Mitigation

Mitigation is not warranted.

5. Biological Resources

a. Special-Status Species, Sensitive Habitats, and Federally Protected Wetlands

Reforestation projects would be expected to result in mostly long-term beneficial effects on biological resources. All forest projects are required by the protocol to use sustainable long-term harvesting practices and natural forest management, which, in general, would promote principles of biodiversity.

While the intended and generally expected result of reforestation projects would be beneficial for biological resources, the potential exists for adverse impacts to biological resources occupying the existing habitat in the project area. Existing habitats of reforestation projects are likely to either consist of understocked forest land or transitional and potentially disturbed habitat on land that was formerly forested, but has had vegetation eliminated in the past by removal (e.g., historic timber harvest) or natural events (e.g., wildfire). Habitat conditions would change with implementation of reforestation projects, including removal of existing and planting of new vegetation. Wildlife species occupying the existing habitat on reforestation project lands could be disturbed and/or displaced to nearby suitable habitat as a result of the reforestation project activities and habitat changes, and wildlife could be lost. Habitat changes and wildlife disruption resulting from implementation of reforestation projects could have a potentially significant impact on biological resources.

Potential short-term ground-disturbing activities for reforestation projects would include tree planting, installation of irrigation systems, or clearing of debris or other forest products from the ground to allow for natural reforestation. Small tools would be used to maintain the planted trees or remove dead, diseased or dying trees that would be replaced. Large mechanized equipment could be used, especially for the removal of dead, diseased, or dying trees, or for soil preparation. In addition, herbicides and rodenticides could be used to reduce competition with weeds or herbivores. Many reforestation project areas are expected to be in a degraded state, so it would be unlikely for special-status species or sensitive habitats to be present. In addition, projects are required to follow local, state and/or federal regulations to protect biological resources during implementation of the project. Also, timber harvests and/or forest management activities are expected to take place on project sites for reasons that are independent of the Forest Offset Protocol, i.e., the sites contain existing or formerly managed forest, because of their property ownership, land use, and/or location, along with market demands for wood products. Consequently, silviculture activities would occur with or without the inclusion of the protocol in the offset program, so a substantial adverse environmental change resulting from forest offset project activities would not be expected. However, the possibility cannot be ruled out that a special-status species or its habitat could be adversely affected, recognizing the changes in habitat expected from the reforestation projects. Therefore, although the risk of adverse impact to special-status species and their sensitive habitats is small, it cannot be eliminated. Furthermore, special-status species and their sensitive habitats deserve extra care in their protection, because of their scarcity and importance. Therefore, a conservative

interpretation (i.e., tending to overstate impacts) would warrant a conclusion that impacts to special-status species and their sensitive habitats are considered to be potentially significant.

All forest projects are expected to include periodic forest management activities, such as thinning to increase resistance to wildfire, insect or disease risks, or to balance age classes, and timber harvests. The requirement of the Forest Offset Protocol to use sustainable long-term harvesting practices and natural forest management would minimize potential impacts to biological resources over the long-term by broadening the goal of increased carbon sequestration to include goals of managing for diversity of native species, multiple forest age classes to support functioning habitat, and complexity of forest structure. However, short-term impacts to biological resources, such as temporary loss of foraging, nesting, sheltering habitat for special-status wildlife or fill or degradation of wetlands, creeks, or other aquatic habitat, could occur during timber harvesting or other forest management activities.

Although short-term impacts to biological resources could occur, timber harvesting and forest management is likely to occur on land proposed for forest offset projects, regardless of the Forest Offset Protocol. Forest projects would occur on land that is currently timber land and could be subject to forest management and periodic timber harvesting under existing market conditions. Timber harvests and/or forest management activities are expected to take place on project sites for reasons that are independent of the Forest Offset Protocol, i.e., the sites contain existing or formerly managed forest, because of their property ownership, land use, and/or location, along with market demands for wood products. Consequently, silviculture activities would occur with or without the inclusion of the protocol in the offset program, so a substantial adverse environmental change resulting from forest offset project activities would not be expected. Therefore, substantial adverse changes in potential impacts to special-status species, sensitive habitats, and federally protected wetlands from implementation of the Forest Offset Protocol would not be expected, compared to existing timber harvesting and forest management activities on a project site.

b. Wildlife or Fishery Movement, Wildlife Corridors, Nursery Sites

Forest projects under the Forest Offset Protocol are not expected to interfere substantially with native wildlife or fish movement or impede the use of movement corridors or nursery sites. Project areas would either be restored to or remain as forested habitat. Management or harvesting activities are expected to be temporary and relatively small scale, and would be expected to occur under a business as usual scenario. Therefore, impacts to wildlife or fish movement, corridors, or nursery sites are considered less than significant.

c. Local Policies or Conservation Plans

Forest projects under the Forest Offset Protocol are not expected to conflict with local plans or policies protecting biological resources or approved habitat conservation plans, natural community conservation plans, or other habitat conservation plans. Existing

conservation plans adopted to comply with the Endangered Species Act or similar state laws establish legal constraints for forest management and timber harvest that must be similarly carried out with or without an offset project. Forest projects are required by the protocol to use sustainable long-term harvesting practices and natural forest management, which, in general, would promote principles of biodiversity. Therefore, impacts to local policies or conservation plans resulting from implementation of the Forest Offset Protocol are considered less than significant.

d. Protocol Mitigation

The following mitigation addresses potentially significant biological impacts resulting from implementation of the Forest Offset Protocol:

- Implement adaptive management, as described in Section 2.E of the FED. Under the Forest Offset Protocol, detailed information about each forest offset project must be submitted to ARB. This includes information about annual GHG reductions or removal enhancements, and any GHG reversals (e.g., from wildfire or unintentional losses from activities such as over-harvesting). ARB will post these annual reports, in full or in summary form, on its website or otherwise make the reports or a summary of the reports publicly available. In addition, ARB will periodically solicit comments from the public and stakeholders, including in-state and out-of-state resource management agencies with jurisdiction over forest offset projects.

  This reported and solicited information will become part of ARB's periodic review of the cap-and-trade program. This review will include an opportunity for public review and comment.

  If unanticipated adverse environmental effects are identified during this periodic review and they are substantial enough to interfere with or undermine the achievement of the objectives for the cap-and-trade program as defined by AB 32, including the objectives set forth in 38562(b) and 38570(b), ARB commits to promptly developing and implementing appropriate responses, including revising the Forest Offset Protocol accordingly.

  Potential responses ARB would consider, if warranted, include, but are not limited to, revising the types and/or geographic location of forest offset projects that are eligible under the Forest Offset Protocol, or disallowing use of certain types of forest offset credits. These potential future responses are not, however, warranted based on currently available information, and, accordingly, their imposition today would not be supported by substantial evidence and would unnecessarily conflict with AB 32's other objectives.

While ARB's commitment to adaptive management would reduce the risks of unintended, significant adverse biological impacts from occurring as a result of the implementation of the Forest Offset Protocol, it would not be feasible to entirely

eliminate them. Although ARB has certain action responses it can take, if needed, it does not have jurisdiction over implementation of physical actions on project sites that would directly avoid or mitigate biological impacts. Consequently the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable.

6. Cultural Resources

a. Historical or Archaeological Resources, Unique Paleontological Resource or Geologic Feature, and Human Remains

Forest projects could conceivably cause direct damage to or destroy identified or undocumented historical resources. These could include archaeological resources that may be historical resources or unique archaeological resources under CEQA, cultural resources eligible for the National Register of Historic Places under the National Historic Preservation Act, undocumented human remains, or unique paleontological resources or sites. The potential sources of damage could be ground-disturbance or demolition activities at the surface or in the subsurface, such as during tree planting in previously undisturbed ground; removal of vegetation or other impediments to reforestation; controlled burns or the creation of fire fuel breaks; demolition of existing buildings or structures; or construction of roadways, bridges, buildings or other infrastructure to manage the forest or harvest trees. Direct impacts to such resources may result from the disturbance of the materials, features, or deposits from vegetation or impediment removal, soil compaction or vibration from vehicles traveling over the surface, earth-moving activities, controlled burns, or demolition of overlying structures. Other potential direct impacts that could occur on a project level include damage to or destruction of traditional Native American cultural resources, such as landscapes, sacred sites, ceremonial use areas, or plant collecting areas.

Forest projects could also result in impacts to identified or undocumented historical resources or significant archaeological resources, including traditional cultural resources, through the potential alteration of the resource setting through the harvesting of trees or the introduction of visual project elements (e.g., roadways, bridges, buildings or other infrastructure) that contrast with the setting of the historical or significant archaeological resource and could diminish the integrity of the resource's significant historic features.

Based on the cultural setting and knowledge of the occurrence and extent of known archaeological resources in forested areas of the nation, a forest project area within public or private lands may be highly sensitive for the discovery of surface or subsurface prehistoric archaeological resources, ethnohistoric archaeological resources, historic-period archaeological resources, and human remains, particularly within or near slope or topographic features, or within natural resource collecting areas considered culturally sensitive by Native Americans, such as natural rivers and streams, springs, ponds/lakes, ecotones, ridgetops, mid-slope benches, flat benches, meadows, oak groves, and source areas for raw materials. The potential for discovery of surface or

subsurface prehistoric archaeological resources, ethnohistoric archaeological resources, historic-period archaeological resources, and human remains is low for a project located in an area that has been previously harvested for timber, although the potential would be higher for deeper excavations that may be required for bridge supports or undercrossings.

The potential for discovery of surface or subsurface historic-period archaeological resources is considered highly sensitive within or near areas directly related to the historic transportation, industrial, and commercial activities, including tourism, and within or near private holdings in national or state forests. Traces of such resources, such as railroad grades and bridges, cabins, hotels, way stations, early lumber industry structures, cemeteries, and early mining operations, can occur in virtually any setting or landform.

The potential for impacts on paleontological resources by forest project activities on the surface or in previously disturbed soils is low, because forest projects would generally not alter previously undisturbed geologic formations. Deeper excavations, such as for construction of bridge supports or undercrossings, however, may extend into and disturb in-situ geologic units of high paleontological potential where Pleistocene or older sedimentary rock units occur at or near the surface in valleys, along mountain foothills within parts of mountain ranges. These units may also exist within very short depths beneath areas mapped as Holocene alluvium, particularly in the major valleys. Although Pleistocene fossil localities are known in the southwestern deserts, forest projects are not expected to occur in the more arid portions of the nation.

The potential for impacts to cultural resources from forest management activities exists under current conditions, because lands that could support a forest offset project are already subject to forest management and/or potentially timber harvest, based on existing ownership and market conditions. Timber harvests and/or forest management activities are expected to take place on project sites for reasons that are independent of the Forest Offset Protocol, i.e., the sites contain existing or formerly managed forest, because of their property ownership, land use, and/or location, along with market demands for wood products. Consequently, silviculture activities would occur with or without the inclusion of the protocol in the offset program, so a substantial adverse environmental change resulting from forest offset project activities would not be expected. Development of a forest offset project would not bring forest management activities to new lands and would not be likely to increase risk of encountering cultural resources. Forest projects would occur on land that was historically forested or currently forested and could be subject to periodic disturbance by forest management activities, such as thinning, hazardous fuel removal, replanting, and timber harvesting under existing conditions. Therefore, a substantial adverse change in the risk of impacts to cultural resources from implementation of the Forest Offset Protocol is not expected and the impact would be less than significant..

b. Protocol Mitigation

Mitigation is not warranted.

7. Energy Demand

a. Increase in Energy Demand and Consumption of Energy Resources

Forest projects would occur on land that currently support or historically supported forests. Forested land is typically subject to periodic forest management activities, such as thinning, hazardous fuel removal, replanting, and/or potentially timber harvest, as determined by existing ownership and market conditions. Timber harvests and forest management would therefore be a part of the baseline of activities on a project site, as determined by factors that are independent of the Forest Offset Protocol, i.e., occurring with or without implementation of the Forest Offset Protocol. The potential for these effects would be present under existing conditions, because land proposed for a forest offset project would already be expected to support forest management and/or timber harvest activities of some type, based on land ownership and market conditions. Therefore, substantial differences in energy demand and consumption from current management practices would not be expected and impacts to energy resources from implementation of the Forest Offset Protocol would be less than significant.

b. Protocol Mitigation

Mitigation is not warranted.

8. Geology, Soils, and Minerals

a. Increased Risk of Rupture of Known Earthquake Fault, Strong Seismic Shaking, Ground Failure, or Landslides

Forest projects could result in a variety of forest management activities that would include the use of workers to plant, trim, cut, and haul away seedlings/trees in designated areas, use of a variety of mobile forestry equipment (e.g., logging trucks, tree saws, tractors, other vehicles), and potentially the establishment of small base camp type facilities (e.g., mobile office buildings, storage buildings) to oversee the reforestation, forest management, and other silvicultural activities. In addition, some new access roads to forest project areas may need to be constructed. Depending on the location of the forest offset projects, facilities (e.g., base camp, access roads) and people (e.g., employees, truck haulers) could be exposed to strong seismic ground shaking, which could cause damage to structures and access roads, blocking access and posing safety hazards to people. However, these risks would be present under existing conditions, because land proposed for a forest offset project would already be expected to support forest management and/or timber harvest activities of some type, based on land ownership and market conditions. The degree of risk would not be substantially different from existing conditions and the impact resulting from implementation of the Forest Offset Protocol would, therefore, be less than significant.

b. Soil Erosion or Loss of Topsoil

Many areas throughout California and in other states are susceptible to soil erosion, although not all areas would exhibit similar vulnerability. Ground-disturbing activities (e.g., tree planting, maintenances, road construction) could result in erosion of onsite

soils and adverse water quality impacts. However, the potential for these effects would be present under existing conditions, because land proposed for a forest offset project would already be expected to support forest management and/or timber harvest activities of some type, based on land ownership and market conditions. The potential for erosion impacts would not be substantially different from existing conditions and the impact resulting from implementation of the Forest Offset Protocol would, therefore, be less than significant.

c. Unstable Soil Conditions

Forest projects could also be located in areas potentially susceptible to the presence of expansive soils or unstable soils particularly in areas of fine-grained sediment accumulation typically associated with playas, valley bottoms, and local low-lying areas. Projects located on these soils potentially could result in on- or off-site landslide, subsidence, liquefaction, or collapse. However, the risk of unstable soil impacts would be present under existing conditions, because land proposed for a forest offset project would already be expected to support forest management and/or timber harvest activities of some type, based on land ownership and market conditions. The degree of risk of encountering unstable soils would not be substantially different from existing conditions and the impact resulting from implementation of the Forest Offset Protocol would, therefore, be less than significant.

d. Mineral Resources

Forest projects could be located in areas that support regionally important mineral resources. However, because land proposed for a forest offset project would already be expected to support forest management and/or timber harvest activities of some type, based on land ownership and market conditions, the potential to conflict with mineral resources would not be substantially different than current conditions. Also, forest management does not preclude future extraction of subsurface mineral resources. The potential for conflict with mineral resources would not be substantially different from existing conditions and the impact resulting from implementation of the Forest Offset Protocol would, therefore, be less than significant.

e. Soils Capable of Supporting Septic Tanks or Alternative Wastewater Disposal

Establishment of base camp facilities for reforestation projects could result in the need to install a septic system or other alternative wastewater disposal system. The soils where these facilities could be located could contain materials that would not be able to adequately support septic tanks or alternative wastewater disposal systems. The specific design details, siting locations, and hazards for a particular project are not known at this time.

The potential for impacts to geology, minerals, and soils from forest management activities exists under current conditions, and is not expected to increase as a result of implementation of the Forest Offset Protocol. Forest projects would occur on land that was historically forested or currently forested and could be subject to periodic forest

management activities, such as thinning, hazardous fuel removal, replanting, and timber harvesting, under existing market conditions. Timber harvests and/or forest management activities are expected to take place on project sites for reasons that are independent of the Forest Offset Protocol, i.e., the sites contain existing or formerly managed forest, because of their property ownership, land use, and/or location, along with market demands for wood products. Consequently, silviculture activities would occur with or without the inclusion of the protocol in the offset program, so a substantial adverse environmental change resulting from forest offset project activities would not be expected. Therefore, no substantial adverse change in the potential for impacts to geology, minerals, and soils would be expected from the implementation of the Forest Offset Protocol and the impacts would be less than significant.

f. Protocol Mitigation

Mitigation is not warranted.

9. Greenhouse Gases

a. Generate GHG Emissions

Forest projects could result in a variety of forest management activities that would include the use of workers to plant, trim, cut, and haul away seedlings/trees in designated areas, use of a variety of mobile forestry equipment (e.g., logging trucks, tree saws, tractors, other vehicles), and potentially the establishment of small base camp type facilities (e.g., mobile office buildings, storage buildings) to oversee the reforestation and forest management activities. These forest management activities would be occurring with or without the offset program, because forest lands would be expected to support existing forest management and/or timber harvest, as determined by land ownership and market conditions independent of the offset project. Under either existing forest management activities or actions resulting from a forest offset project, the wood, trimmings, and other slash hauled from the designated forestry sites may be kept on site, burned in slash piles, disposed at landfills, sent to established wood processing facilities, lumber yards, or existing or new biomass power or CHP facilities. For a forest offset project, the uses of wood biomass are included in the carbon accounting to ensure that there is a net GHG reduction over the life of the project.

The potential for use of mobile forestry equipment, employment of forest project personnel, and forest biomass transport activities would result in emissions of GHGs. However, these forest management activities would be occurring with or without the Forest Offset Protocol, and are not expected to differ significantly or increase relative to baseline conditions except in the case of reforestation site preparation activities. In that circumstance, emissions associated with site preparation are included in the project accounting.

Forest projects would result in a net reduction in GHG emissions through increased rates of sequestration that outweigh GHG emissions from forestry activities. Thus,

approved offset projects would result in reduced GHG emissions and associated beneficial impacts.

b. Protocol Mitigation

Mitigation is not warranted.

10. Hazards and Hazardous Materials

a. Hazardous Materials, Hazardous Emissions, and Natural Hazards

Forest projects could conceivably result in a variety of forest management activities that would involve the use of hazardous materials including fuels and lubricants for mobile forestry equipment (e.g., logging trucks, tree saws, tractors, other vehicles) and minor use of household cleaning solvents at base camp operations. Further, forestry operations could create worker hazards, because of the potential hazards of falling trees and use of dangerous equipment (e.g., saws, large tractors). These risks of potential hazard-related consequences would be present under existing conditions, as well, because the land involved in a forest offset project would be subject to existing forest management and/or timber harvest activities, as determined by independent factors, such as property ownership and market conditions. As a result, the risk of hazards would exist with or without a forest offset project.

Forest projects would be required to secure appropriate permits and/or entitlements from government entities. Projects in California would be required to comply with CEQA and where a federal permit is required, NEPA may be required. (Federal lands are not eligible for forest projects). Through the entitlement process in these areas, necessary approvals for operation would be obtained with consideration of potential environmental effects including hazards and hazardous material impacts. Further, projects using hazardous materials would be required to comply with all appropriate federal, state, and local requirements regulating their use, storage, and transport. In addition, projects would be required to comply with all applicable workplace safety requirements including the Occupational Safety and Health Administration (OSHA) requirements, which typically require the preparation of appropriate safety plans. Finally, forest projects would also be required to implement appropriate emergency response/evacuation plans and wildfire risk reduction plans. Therefore, for forest projects in areas subject to CEQA and/or NEPA, less than significant hazard and hazardous material impacts would be expected.

Forest projects would occur on land that currently support or historically supported forests. Forested land is typically subject to periodic forest management activities, such as thinning, hazardous fuel removal, replanting, and/or potentially timber harvest, as determined by existing ownership and market conditions. Timber harvests and forest management would, therefore, be a part of the baseline of activities on a project site, as determined by factors that are independent of the Forest Offset Protocol, i.e., occurring with or without implementation of the protocol. Establishing a forest offset project would not be expected to result in the exercise of forest management activities where they could not already occur in some form, based on property ownership and market

conditions. Therefore, substantial differences in the use of hazardous materials or risk of encountering other hazards from current management practices would not be expected and impacts related to hazards from implementation of the Forest Offset Protocol would be less than significant.

b. Protocol Mitigation

Mitigation is not warranted.

11. Hydrology and Water Quality

a. Existing Drainage Patterns and Storm water Drainage

Forest projects could result in a variety of forest management activities that would include the use of workers to plant, trim, cut, and haul away seedlings/trees in designated areas, use of a variety of mobile forestry equipment (e.g., logging trucks, tree saws, tractors, other vehicles), and potentially the establishment of small base camp type facilities (e.g., mobile office buildings, storage buildings) to oversee the reforestation and forest management activities. Many of these activities could result in ground disturbance during construction and operation of the offset project. However, because land proposed for a forest offset project would already be expected to support forest management and/or timber harvest activities of some type, based on land ownership and market conditions, the potential to create adverse drainage and hydrology conditions would not be substantially different than current conditions.

b. Water Quality Standards and Waste Discharge Requirements

Timber harvests on private land in California would be subject to California Forest Practice Rules. Commercial timber companies with landholdings of a qualifying size (at least 2,500 acres) are required to prepare a Timber Harvest Plan (which is a part of a certified regulatory program that includes a CEQA-equivalent environmental document). Non-commercial Timber Management Plans can be used if an owner has less than 2,500 acres and is not in the business of manufacturing forest products. In those cases, the owner must choose to use uneven-aged management methods (i.e., selectively harvesting trees) and must plan for sustained yield over time. When THPs are required, they must include appropriate mitigation to address erosion and stormwater quality issues. Projects in California would also be required to comply with CEQA and where a federal permit is required, NEPA compliance may be necessary. Through the entitlement process in these areas, necessary approvals for operation would be obtained with consideration of potential environmental effects including impacts to hydrology and water quality. Further, other local, State, or Federal requirements (e.g., National Pollutant Discharge Elimination System, Stormwater Pollution Prevention Plans, water quality regulations in other states) would also be imposed to protect water quality where applicable. Because land proposed for a forest offset project would already be expected to support forest management and/or timber harvest activities of some type, based on land ownership and market conditions, the potential to create adverse hydrology and water quality impacts would not be substantially different than current conditions.

Recognizing that land proposed for a forest offset project would already be expected to support forest management and/or timber harvest activities and that laws and regulations protect water quality in California (i.e., through both state and federal laws) and outside the state (i.e., through federal laws), less than significant water quality impacts would be expected from implementation of the Forest Offset Protocol.

c. Flood Hazard, Flood Risk, and Inundation

With regards to potential risks from a tsunami or seiche, forest projects, by their nature, would be located in elevated areas (e.g., foothills, mountains) that are not typically subject to the effects of ocean-generated tsunamis. Nonetheless, because the nature of the forest projects generally involve the use of construction equipment spread out through a project area, minimal base camp facilities (i.e., portable building shed), and trees, it is not expected that forest offset projects would result in substantial risks to people or property as a result of a tsunami. Similarly, forest offset projects that are located near open water bodies, would not result in substantial risks to people or property as a result of a seiche.

Some forest projects may be located in areas that are potentially susceptible to mudflows during large rain events. The planting of additional trees and the establishment of mature tree roots systems can help strengthen and stabilize steep and erodible soils; therefore, this would be a beneficial impact of this offset over the long-term. In the short-term, exposed soils after harvesting may be a greater risk of eroding or creating a mudslide; however, the offset protocol would not increase timber harvest area or frequency, so the risk would not be increased above existing conditions.

The potential for hydrology and water quality impacts from forest management activities exists under current conditions, and is not likely to increase as a result of implementation of the Forest Offset Protocol. Forest projects would occur on land that was historically forested or currently forested and could be subject to periodic forest management activities, such as thinning, hazardous fuel removal, replanting, and timber harvesting, under existing market conditions. Timber harvests and/or forest management activities are expected to take place on project sites for reasons that are independent of the Forest Offset Protocol, i.e., the sites contain existing or formerly managed forest, because of their property ownership, land use, and/or location, along with market demands for wood products. Consequently, silviculture activities would occur with or without the inclusion of the protocol in the offset program, so a substantial adverse environmental change resulting from forest offset project activities would not be expected. Therefore, hydrology and water quality impacts from implementation of the Forest Offset Protocol are considered less than significant.

d. Protocol Mitigation

Mitigation is not warranted.

12. Land Use and Planning

a. Conflict with Land Use Plan, Policy or Regulation or Physically Divide a Community

Forest projects would not be expected in areas that would be considered incompatible with the surrounding land uses or that physically divide an established community. Projects that cause a physical division to communities typically consist of bifurcations, such as freeways, railroads, or other linear facilities. Reforestation projects are expected to primarily occur in open, previously forested areas, rather than within developed communities. Improved forest management projects would occur on existing forest land and would remain as forest land, which is not expected to conflict with land use plans or physically divide communities. It is also anticipated that most road improvements associated with forest management activities for all project types, if any, would likely take place within existing transportation rights-of-way or along existing transportation corridors and, therefore, would not physically divide an existing community or conflict with existing land uses. This impact would be a less than significant.

Avoided conversion projects could conflict with local planned land uses. Avoided conversion projects involve preventing the conversion of forestland to a non-forest land use by dedicating the land to continuous forest cover through a conservation easement or transfer to public ownership where forests are at risk of conversion. Specifically, in order to qualify as an avoided conversion project, the private forest owner must demonstrate there is a significant threat of conversion of the project land to a non-forest use. In order to demonstrate that the land is likely to be converted to a non-forest use, the private land owner must provide a real estate appraisal showing that potential non-forest land use would generate substantially higher land value than forest use and at least one of the following forms of documentation that the potential conversion would be legally permissible:

1. Documentation indicating that the current land use policies, including zoning and general plan ordinances, and other local and state statutes and regulations, permit the anticipated type of conversion.

2. Documentation indicating that the Forest Owner has obtained all necessary approvals from the governing county to convert the project area to the proposed type of non-forest land use (including, for instance, certificates of compliance, subdivision approvals, timber conversion permits, other rezoning, major or minor use permits, etc.)

3. Documentation indicating that similarly situated forestlands within the project's assessment area were recently able to obtain all necessary approvals from the governing county, state, or other governing agency to convert to a non-forest land use (including, for instance, certificates of compliance, subdivision approvals, timber conversion permits, other rezoning, major or minor use permits, etc.)

Because avoided conversion projects could occur on land planned for other, non-forest uses and, if so, would prevent the planned non-forest use from occurring, avoided conversion projects could conflict with local land use plans. This would be a significant impact resulting from implementation of the Forest Offset Protocol.

b. Conflict with Habitat Conservation Plan or Natural Community Conservation Plan

All proposed offset projects would be required to secure appropriate permits and/or entitlements from appropriate government entities. Projects in California would be required to comply with CEQA and where a federal permit is required, compliance with NEPA may be necessary. Projects in an area subject to a Habitat Conservation Plan under the federal Endangered Species Act or, in California, a Natural Communities Conservation Plan would be bound by the legal restrictions of those conservation plans. Projects that need approval by local governments would be required to be consistent with any applicable planning document, including the jurisdiction's general plan, any applicable specific plan, and zoning requirements. Most land use plans include policies intended to avoid development which would result in land use incompatibility. Therefore, forest projects would not be expected to conflict with Habitat Conservation Plans or Natural Communities Conservation Plans. Also, reforestation and improved forest management projects are not anticipated to cause land use conflicts. Further, policies intended to protect important resource areas, promote clustered development, and enhance visual separation would help prevent loss of community character and separation, if any resulting from the reforestation and improved forest management projects. Therefore, implementation of the Forest Offset Protocol would result in less than significant impacts related to Habitat Conservation Plans and Natural Communities Conservation Plans.

c. Protocol Mitigation

The following mitigation measure (LU-1) applies to the Forest Offset Protocol avoided conversion projects.

- Proponents of avoided conversion offset projects under the Forest Offset Protocol will coordinate with local land use agencies to reconcile land use plan and zoning designations and the ongoing undeveloped forest condition of the project area. Local land use agencies will complete appropriate reviews to ensure that the project complies with applicable land use plans and regulations, or where conflicts exist, will implement appropriate land use designation changes so that proposed avoided conversion projects would be compatible with appropriate land use documents and policies. Land use agencies should consider compatible densities and land use types at the edges of the avoided conversion area and the avoided conversion project should conform, to the extent feasible, with applicable land use goals, objectives, and policies.

Because ARB does not have jurisdiction over local land use decisions, it cannot guarantee that the mitigation described above will be implemented. Further, because

conflicts with planned future land uses are inherent to avoided conversion projects, impacts of the avoided conversion projects on land use are considered significant and unavoidable, even with implementation of feasible mitigation.

13. Noise

a. Permanent or Temporary Increase in Ambient Noise Levels

Forest projects could result in a variety of forest management activities that would include the use of workers to plant, trim, cut, and haul away seedlings/trees in designated areas, use of a variety of mobile forestry equipment (e.g., logging trucks, tree saws, tractors, other vehicles), and potentially the establishment of small base camp type facilities (e.g., mobile office buildings, storage buildings) to oversee the reforestation and forest management activities. Under some forest projects, the wood, trimmings, and other slash hauled from the designated forestry sites may be sent to established wood processing facilities, lumber yards, or existing or new biomass power or CHP facilities.

All of these activities would generate noise; however, the activities would be expected to occur on forest lands proposed for offsets with or without an offset project. The noise generating activities from forest management activities exist under current conditions, and are not likely to increase as a result of implementation of the Forest Offset Protocol. Forest projects would occur on land that was historically forested or currently forested and could be subject to periodic forest management activities, such as thinning, hazardous fuel removal, replanting, and timber harvesting, under existing market conditions. Timber harvests and forest management activities are independent of the Forest Offset Protocol and would occur with or without inclusion of the protocol in the offset program. Therefore, the noise impacts from implementation of the Forest Offset Protocol summarized as follows would be less than significant.

Noise levels from the use of heavy-duty equipment in the vicinity of forest projects would fluctuate depending on the particular type, number, and duration of usage. The effects of this type of noise largely depends on the type of activities occurring on any given day, noise levels generated by those activities, distances to noise sensitive receptors, and the existing ambient noise environment in the receptor's vicinity. To assess noise levels associated with the various equipment types and operations, equipment can be considered to operate in two modes, mobile and stationary. Mobile equipment sources move around a site performing tasks in a recurring manner. Stationary equipment operates in a given location for an extended period of time to perform continuous or periodic operations. Operational characteristics of heavy construction equipment are additionally typified by short periods of full-power operation followed by extended periods of operation at lower power, idling, or powered-off conditions.

Additionally when related noise levels are being evaluated, activities that occur during the more noise-sensitive evening and nighttime hours are of increased concern. Because exterior ambient noise levels typically decrease during the late evening and

nighttime hours as traffic volumes and commercial activities decrease, activities performed during these more noise-sensitive periods of the day can result in increased annoyance and potential sleep disruption for occupants of nearby residential uses.

Although a detailed equipment list is not currently available, it is expected that the primary sources of noise from forest projects would include trucks and tractors. Noise emission levels from typical types of heavy-duty equipment are shown in Table 4F-1 below.

Table 4F-1
Noise Emission Levels from Heavy-Duty Equipment

Equipment Type	Typical Noise Level (dBA) @ 50 feet
Air Compressor	78
Asphalt Paver	77
Backhoe	78
Blasting	94
Compactor	83
Concrete Breaker	82
Concrete Pump	81
Concrete Saw	90
Crane, Mobile	81
Dozer	82
Front-end Loader	79
Generator	81
Grade	85
Hoe Ram Extension	90
Jack Hammer	89
Pneumatic Tools	85
Rock Drill	81
Scraper	84
Trucks	74–81
Water Pump	81

Notes:
Assumes all equipment is fitted with a properly maintained and operational noise control device, per manufacturer specifications.
Noise levels listed are manufacture-specified noise levels for each piece of heavy construction equipment.

Source: FTA 2006

Based on the information provided in Table 4.F-1 and accounting for typical usage factors of individual pieces of equipment and activity types, on-site construction could result in hourly average noise levels of 87 dBA L_{eq} at 50 feet and maximum noise levels of 90 dBA L_{max} at 50 feet from the simultaneous operation of heavy-duty equipment and blasting activities. Based on these and general attenuation rates, exterior noise levels at noise-sensitive receptors located within thousands of feet from project sites could

exceed typical standards (e.g., 50/60 dBA L_{eq}/L_{max} during the daytime hours and 40/50 dBA L_{eq}/L_{max} during the nighttime hours). However, because timber harvest and forest management activities that would generate this potential level of noise could take place independent of the Forest Offset Protocol, based on property ownership and market conditions, they would occur with or without inclusion of the protocol in the offset program. Therefore, the noise impacts from implementation of the Forest Offset Protocol would be less than significant.

b. Exposure to Excessive Noise or Ground Vibration

Additionally, timber harvest and forest management activities may result in varying degrees of temporary groundborne noise and vibration, depending on the specific equipment used and activities involved. Groundborne noise and vibration levels caused by various types of construction equipment and activities (e.g., bulldozers, blasting) are summarized in Table 4F-2. Similar to the above discussion, although a detailed construction equipment list for forest projects is not currently available, it is expected that the primary source of groundborne vibration and noise would include trucks. According to the Federal Transit Administration (FTA), which is the U.S. Department of Transportation's leader in developing vibration standards, levels associated with the use trucks is 0.076 in/sec peak particle velocity, or PPV, (which is 86 vibration decibels, or VdB) at 25 feet, as shown in Table 4F-2. With respect to the FTA standard for prevention of structural damage, the forest project activities would not exceed recommended levels (e.g., 0.2 in/sec PPV). Based on FTA's recommended procedure for applying a propagation adjustment to these reference levels, truck activities could exceed recommended levels to prevent human disturbance (e.g., 80 VdB) out to a distance of 275 feet. However, because timber harvest and forest management activities that would generate this potential level of vibration could take place independent of the Forest Offset Protocol, based on property ownership and market conditions, they would occur with or without inclusion of the protocol in the offset program. Therefore, the noise impacts from implementation of the Forest Offset Protocol would be less than significant.

c. Traffic Source Noise

Implementation of forest projects could result in vehicle trips on the affected roadway systems from worker commute-, maintenance/operation-, and material delivery-related trips) and, consequently, a source of traffic noise. The exact number of daily trips required for project operations or the location of affected roadways segments is not known at this time; however, a substantial increase in trip generation would not be expected, because lands proposed for offset projects would already be experiencing forest management activities. Average daily traffic (ADT) volume needs to double on a roadway segment in comparison to existing conditions to result in an increase of approximately 3 dB CNEL/L_{dn}, which is typically the noise level change perceptible to the human ear.

Table 4F-2
Representative Groundborne Noise and Vibration Levels for Construction Equipment

Equipment	PPV at 25 feet (in/sec)[1]	Approximate L_v (VdB) at 25 feet[2]
Blasting		109
Large Bulldozer	0.089	87
Caisson Drilling	0.089	87
Trucks	0.076	86
Rock Breaker		
Jackhammer	0.035	79
Small Bulldozer	0.003	58

[1] Where PPV is the peak particle velocity
[2] Where Lv is the root mean square velocity expressed in vibration decibels (VdB), assuming a crest factor of 4.

Source: FTA 2006

The potential for noise impacts from forest management activities exists under current conditions, and is not likely to increase as a result of implementation of the Forest Offset Protocol. Forest projects would occur on land that was historically forested or currently forested and could be subject to periodic forest management activities, such as thinning, hazardous fuel removal, replanting, and timber harvesting, under existing market conditions. Timber harvests and/or forest management activities are expected to take place on project sites for reasons that are independent of the Forest Offset Protocol, i.e., the sites contain existing or formerly managed forest, because of their property ownership, land use, and/or location, along with market demands for wood products. Consequently, silviculture activities would occur with or without the inclusion of the protocol in the offset program, so a substantial adverse environmental change resulting from forest offset project activities would not be expected. Therefore, noise impacts from implementation of the Forest Offset Protocol would be less than significant.

d. Protocol Mitigation

Mitigation is not warranted.

14. Employment, Population, and Housing

a. Population Growth and Housing

Forest projects could result in a variety of forest management activities that would include the use of workers to plant, trim, cut, harvest, and haul away seedlings/trees in designated areas, use of a variety of mobile forestry equipment (e.g., logging trucks, tree saws, tractors, other vehicles), and potentially establish small base camp type facilities (e.g., mobile office buildings, storage buildings) to oversee the reforestation

and forest management activities. It is anticipated that forest projects would result in the creation of limited employment opportunities (e.g., reasonably estimated to be approximately 20 positions or fewer per project). Proposed forest offset projects would not be concentrated in any one area. Given the anticipated dispersion of project locations and the limited number of new employment opportunities associated with a project, the number of workers migrating to a project area would be minimal, resulting in minor impacts to employment, population, and housing supplies. Therefore, it is expected that forest project impacts related to employment, population, and housing supplies from implementation of the Forest Offset Protocol would be less than significant.

b. Protocol Mitigation

Mitigation is not warranted.

15. Public Services

a. Service Ratios, Response Times, and Other Performance Objectives

Forest projects could result in a variety of forest management activities that would include the use of workers to plant, trim, cut, and haul away seedlings/trees in designated areas, use of a variety of mobile forestry equipment (e.g., logging trucks, tree saws, tractors, other vehicles), and potentially the establishment of small base camp type facilities (e.g., mobile office buildings, storage buildings) to oversee the reforestation and forest management activities. Under some forest projects, the wood, trimmings and other slash hauled from the designated forestry sites may be sent to established wood processing facilities, lumber yards, or existing or new biomass power or CHP facilities.

The potential for base-camp facilities or the presence of other forest offset project personnel and activities would not result in a substantial demand for public services above and beyond what could be provided by existing service providers, because these facilities would be small (e.g., portable trailer, storage facilities), forest personnel would be dispersed without large concentrations of activities, and they would not result in substantial demands for police, fire, or emergency response services. Some forest projects would result in the creation of limited employment opportunities (e.g., reasonably estimated to be approximately 20 positions or fewer per project), but these positions would not result in the need for extensive work facilities or housing such that new or expanded school facilities would be required. Further, it is anticipated that proposed forest offset projects would not be concentrated in any one area such that capacities of public service providers would be exceeded.

All forest projects would be required to secure appropriate permits and/or entitlements from appropriate government entities. Projects in California would be required to comply with CEQA and where a federal permit is required, NEPA compliance may be necessary. Through the entitlement process in these areas, necessary approvals for public services would be obtained with consideration of potential environmental effects. Timber harvests and/or forest management activities are expected to take place on

project sites for reasons that are independent of the Forest Offset Protocol, i.e., the sites contain existing or formerly managed forest, because of their property ownership, land use, and/or location, along with market demands for wood products. Consequently, silviculture activities would occur with or without the inclusion of the protocol in the offset program, so a substantial adverse environmental change resulting from forest offset project activities would not be expected. Public service impacts from implementation of the Forest Offset Protocol would be less than significant.

b. Protocol Mitigation

Mitigation is not warranted.

16. Recreation

a. Use or Expansion of Existing Recreational Facilities

Forest projects could result in enhancement to recreational areas by improving, expanding, or creating new forests in recreational areas. These offset projects would involve tree restoration and/or forest management and maintenance activities. This would be a beneficial impact.

Forest projects could involve the construction of roads, temporary and/or permanent area closures for tree installation or forest management/maintenance activities, and periodic increases in truck and/or construction equipment traffic. For offset projects located in established recreation areas, these activities could directly or indirectly disrupt recreational activities.

The potential for these impacts to recreation from forest management activities exists under current conditions, and is not likely to increase as a result of implementation of the Forest Offset Protocol. Forest projects would occur on land that was historically forested or currently forested and could be subject to periodic forest management activities, such as thinning, hazardous fuel removal, replanting, and timber harvesting, under existing market conditions. Timber harvests and/or forest management activities are expected to take place on project sites for reasons that are independent of the Forest Offset Protocol, i.e., the sites contain existing or formerly managed forest, because of their property ownership, land use, and/or location, along with market demands for wood products. Consequently, silviculture activities would occur with or without the inclusion of the protocol in the offset program, so a substantial adverse environmental change resulting from forest offset project activities would not be expected. Therefore, impacts to recreation resulting from implementation of the Forest Offset Protocol are considered less than significant.

b. Protocol Mitigation

Mitigation is not warranted.

17. Transportation and Traffic

a. Performance of the Transportation System

Forest projects could result in a variety of forest management activities that would include the use of workers to plant, trim, cut, and haul away seedlings/trees in designated areas, use of a variety of mobile forestry equipment (e.g., logging trucks, tree saws, tractors, other vehicles), and potentially the establishment of small base camp type facilities (e.g., mobile office buildings, storage buildings) to oversee the reforestation and forest management activities. Under some forest projects, the wood, trimmings, and other slash hauled from the designated forestry sites may be sent to established wood processing facilities, lumber yards, or existing or new biomass power or CHP facilities.

Although detailed information is not currently available, forest projects would be anticipated to result in short-term construction and long-term operational traffic (primarily motorized) from worker commute-, maintenance/operation-, and material delivery-activities. The amount of construction activity would fluctuate depending on the particular type, number, and duration of usage for the varying equipment; and the phase of construction (e.g., construction, erection).

The potential for impacts to transportation and traffic from forest management activities exists under current conditions, and is not likely to increase as a result of implementation of the Forest Offset Protocol. Forest projects would occur on land that was historically forested or currently forested and could be subject to periodic forest management activities, such as thinning, hazardous fuel removal, replanting, and timber harvesting, under existing market conditions. Timber harvests and/or forest management activities are expected to take place on project sites for reasons that are independent of the Forest Offset Protocol, i.e., the sites contain existing or formerly managed forest, because of their property ownership, land use, and/or location, along with market demands for wood products. Consequently, silviculture activities would occur with or without the inclusion of the protocol in the offset program, so a substantial adverse environmental change resulting from forest offset project activities would not be expected. Therefore, impacts to transportation and traffic resulting from implementation of the Forest Offset Protocol are considered less than significant.

b. Protocol Mitigation

Mitigation is not warranted.

18. Utilities and Service Systems

a. Wastewater Services, Stormwater Facilities, Water Demand and Supply, Landfill Capacity, and Solid Waste Regulation

Forest offset projects could potentially include the establishment of small base camp type facilities (e.g., mobile building) that would connect to electricity and other services (e.g., wastewater, water, and solid waste services) to oversee the forest management activities. The base-camp facilities would be small and because of their remote location and the likelihood that projects would not be concentrated in any one locations, these programs would not be anticipated to result in a substantial demand for utilities and service systems (e.g., solid waste facilities capacity, electricity, natural gas, wastewater services, water demand and supply services, wastewater treatment requirements, and solid waste regulations) above and beyond what could be provided by existing service providers and resources. This impact would be less than significant.

b. Protocol Mitigation

Mitigation is not warranted.

19. Indirect Impacts of the Protocol

Indirect impacts may occur when projects implemented under the proposed Forest Offset Protocol create an economic or other indirect influence that secondarily leads to environmental impacts. The only potentially anticipated indirect impact of the Forest Offset Protocol would be to biology, hydrology and water quality, and/or soil resources as a result of road construction to access project areas for restoration, timber harvesting, or other silvicultural activities. There are no other known indirect impacts.

a. Road Construction

Forest management activities typically require construction of new roads to access areas to be logged or treated. Roads would be required to access the project area to conduct restoration activities, surveys and inventories, thinning, hazardous fuel removals, timber harvesting, and other management activities. Timber harvesting, in particular, may require road construction, widening, or other improvements to provide access for heavy machinery (e.g., harvesters, skidders, loaders, haul trucks). Road building is one of the main causes of environmental degradation in forest areas (International Forest Resources, 2004, Chapter 1, p. 24). Poorly built roads can result in soil disturbance, decreased soil permeability, increased risk of erosion, slope failures, and siltation of waterways. The larger the road network, the greater the potential impacts to biological resources. Road use can lead to increased collisions between vehicles and wildlife. Roads providing access to remote areas can result in increased hunting pressure on wildlife populations, or serve to open forests to marijuana or other drug production, poaching, or other illegal activities leading to further forest degradation. Road construction and use fragment remaining forest habitat and could impede native fish and wildlife movement or use of nursery sites.

Increased road building as an indirect consequence of the Forest Offset Protocol could conceivably result in adverse impacts to biological, hydrology and water quality, and/or soil resources. However, these impacts are expected to occur under baseline conditions, and are not likely to increase as a result of implementation of the Forest Offset Protocol. Forest projects would occur on land that was historically forested or currently forested and could be subject to periodic forest management activities, such as thinning, hazardous fuel removal, replanting, and timber harvesting, under existing market conditions. Timber harvests and forest management activities are independent of the Forest Offset Protocol and would occur with or without the protocol as part of the offset program. Therefore, indirect impacts from road construction or improvement as a result of implementation of the Forest Offset Protocol would be less than significant.

b. Protocol Mitigation

No mitigation is required for indirect impacts.

20. Summary of Impacts and Mitigation Measures

The significance determinations identified below reflect the programmatic nature of the analysis of the reasonably foreseeable methods of compliance with the cap-and-trade regulation. Because of this, the FED analysis addresses broadly defined types of impacts without the ability to determine the specific project locations, facility size, character, or site-specific environmental characteristic affected. As a result impact issues may be determined to be potentially significant because of the inherent uncertainties about the relationship between future projects and environmentally sensitive resources or conditions. This is a conservative approach (i.e., tending to overstate environmental impacts), in light of these uncertainties, to satisfy the good-faith, full disclosure purpose of CEQA. When specific projects are proposed and subjected to project-level environmental review, it is expected that many of the impacts identified as potentially significant can be avoided or maintained at a less than significant level.

Another inherent uncertainty in the FED analysis is the degree of implementation of mitigation for potentially significant impacts. While ARB is responsible for adopting the cap-and-trade regulation and implementing the program, it does not have the authority over the proposal, approval or implementation of project or location-specific actions or offset projects. Additionally, federal agencies must approve projects and require mitigation for where federal permits are needed for specific environmental resource impacts, such as take of endangered species or filling of wetlands.

Because ARB is not responsible for implementation of project-specific mitigation and the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, whether potentially significant environmental impacts may be unavoidable.

a. Summary Impact Matrix for the Forest Offset Protocol

Forest Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Aesthetics			
1. Scenic Vistas, Scenic Resources, Visual Character, Light and Glare	Less than Significant	Mitigation is not warranted	Less than Significant
Agricultural and Forest Resources			
1. Conversion of Agricultural Land or Forest Land or Conflict with Zoning	Less than Significant	Mitigation is not warranted	Less than Significant
Air Quality			
1. Criteria Air Pollutants and Toxic Air Contaminants	Less than Significant	Mitigation is not warranted	Less than Significant
Biological Resources			
1. Special-Status Species, Sensitive Habitats, and Federally Protected Wetlands	Potentially Significant	Implement adaptive management, as described in Section 2.E of the FED. Under the Forest Offset Protocol, detailed information about each forest offset project must be submitted to ARB. This includes information about annual GHG reductions or removal enhancements, and any GHG reversals (e.g., from wildfire or unintentional losses from activities such as over-harvesting). ARB will post these annual reports, in full or in summary form, on its website or otherwise make the reports or a summary of the reports publicly available. In addition, ARB will periodically solicit comments from the public and stakeholders, including in-state and out-of-state resource management agencies with jurisdiction over forest offset projects. This reported and solicited information will become part of ARB's periodic review of the cap-and-trade program. This review will include an opportunity for	Significant and Unavoidable

Forest Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
		public review and comment. If unanticipated adverse environmental effects are identified during this periodic review and they are substantial enough to interfere with or undermine the achievement of the objectives for the cap-and-trade program as defined by AB 32, including the objectives set forth in 38562(b) and 38570(b), ARB commits to promptly developing and implementing appropriate responses, including revising the Forest Offset Protocol accordingly. Potential responses ARB would consider, if warranted, include, but are not limited to, revising the types and/or geographic location of forest offset projects that are eligible under the Forest Offset Protocol, or disallowing use of certain types of forest offset credits. These potential future responses are not, however, warranted based on currently available information, and, accordingly, their imposition today would not be supported by substantial evidence and would unnecessarily conflict with AB 32's other objectives.	
2. Wildlife or Fishery Movement, Wildlife Corridors, Nursery Sites	Less than Significant	Mitigation is not warranted	Less than Significant
3. Local Policies or Conservation Plans	Less than Significant	Mitigation is not warranted	Less than Significant
Cultural Resources			
1. Historical or Archaeological Resources, Unique Paleontological Resource or Geologic Feature, and Human Remains	Less than Significant	Mitigation is not warranted	Less than Significant
Energy Demand			
1. Increase in Energy Demand and Consumption of Energy Resources	Less than Significant	Mitigation is not warranted	Less than Significant

Forest Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Geology, Soils, and Minerals			
1. Increased Risk of Rupture of Known Earthquake Fault, Strong Seismic Shaking, Ground Failure, or Landslides	Less than Significant	Mitigation is not warranted	Less than Significant
2. Soil Erosion or Loss of Topsoil	Less than Significant	Mitigation is not warranted	Less than Significant
3. Unstable Soil Conditions	Less than Significant	Mitigation is not warranted	Less than Significant
4. Mineral Resources	Less than Significant	Mitigation is not warranted	Less than Significant
5. Soils Capable of Supporting Septic Tanks or Alternative Wastewater Disposal	Less than Significant	Mitigation is not warranted	Less than Significant
Greenhouse Gases			
1. Generate GHG Emissions	Beneficial	Mitigation is not warranted	Beneficial
Hazards and Hazardous Materials			
1. Hazardous Materials, Hazardous Emissions, and Natural Hazards	Less than Significant	Mitigation is not warranted	Less than Significant
Hydrology, Water Quality and Water Supply			
1. Existing Drainage Patterns and Storm water Drainage	No impact	Mitigation is not warranted	No impact
2. Water Quality Standards and Waste Discharge Requirements	No impact	Mitigation is not warranted	No impact
3. Flood Hazard, Flood Risk, and Inundation	Less than Significant	Mitigation is not warranted	Less than Significant

Forest Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Land Use			
1. Conflict with Land Use Plan, Policy or Regulation or Physically Divide a Community	Significant	Proponents of avoided conversion offset projects under the Forest Offset Protocol will coordinate with local land use agencies to reconcile land use plan and zoning designations and the ongoing undeveloped forest condition of the project area. Local land use agencies will complete appropriate reviews to ensure that the project complies with applicable land use plans and regulations, or where conflicts exist, will implement appropriate land use designation changes so that proposed avoided conversion projects would be compatible with appropriate land use documents and policies. Land use agencies should consider compatible densities and land use types at the edges of the avoided conversion area and the avoided conversion project should conform, to the extent feasible, with applicable land use goals, objectives, and policies.	Significant and Unavoidable
2. Conflict with Habitat Conservation Plan or Natural Community Conservation Plan	Less than Significant	Mitigation is not warranted	Less than Significant
Noise			
1. Permanent or Temporary Increase in Ambient Noise Levels	Less than Significant	Mitigation is not warranted	Less than Significant
2. Exposure to Excessive Noise or Ground Vibration	Less than Significant	Mitigation is not warranted	Less than Significant
3. Traffic Source Noise	Less than Significant	Mitigation is not warranted	Less than Significant
Employment, Population, and Housing			
1. Population Growth and Housing	Less than Significant	Mitigation is not warranted	Less than Significant

Forest Offset Protocol	Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Public Services			
1. Service Ratios, Response Times, and Other Performance Objectives	Less than Significant	Mitigation is not warranted	Less than Significant
Recreation			
1. Use or Expansion of Existing Recreational Facilities	Less than Significant	Mitigation is not warranted	Less than Significant
Transportation and Traffic			
1. Performance of the Transportation System	Less than Significant	Mitigation is not warranted	Less than Significant
Utilities and Service Systems			
1. Wastewater Services, Stormwater Facilities, Water Demand and Supply, Landfill Capacity, and Solid Waste Regulation	Less than Significant	Mitigation is not warranted	Less than Significant
Indirect			
1. Road Construction	Less than Significant	Mitigation is not warranted	Less than Significant

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5.0 CUMULATIVE AND GROWTH-INDUCING IMPACTS

A. Introduction

Cumulative impacts are impacts on the environment that result from the incremental impacts of a proposed project when added to other past, present, and reasonably foreseeable future actions (CEQA Guidelines Section 15355[b]). Such impacts can result from individually minor but collectively significant actions taking place over time. CEQA Guidelines Section 15130 states that the discussion of cumulative impacts need not provide as much detail as the discussion of effects attributable to the project alone.

Recognizing the programmatic nature of the FED, cumulative impacts for resource topics are disclosed in general qualitative terms as they pertain to reasonably foreseeable development. The State CEQA Guidelines require that cumulative impacts be addressed when the cumulative impacts are expected to be significant and when the project's incremental contribution to the effect is cumulatively considerable (CEQA Guidelines Section 15130[a]). Where a lead agency is examining a project with an incremental effect that is not "cumulatively considerable," a lead agency need not consider that effect significant, but must briefly describe its basis for concluding that the incremental effect is not cumulatively considerable. EIRs must consider "other projects creating related impacts." (CEQA Guidelines, § 15130(a)(1). CEQA Guidelines Section 15355(b) requires an analysis of "other closely related past, present, and reasonably foreseeable probable future projects". ARB is, accordingly, considering in the cumulative impacts analysis of other projects that, like cap-and-trade, are designed to *reduce* annual emissions of GHGs, and not simply every project that emits GHGs. This approach is "guided by the standards of practicality and reasonableness" (15130(b)) and serves the purposes of the cumulative impacts analysis, which is to provide "a context for considering whether the incremental effects of the project at issue are considerable" when judged "against the backdrop of the environmental effects of other projects." (CBE v. Cal. Res. Agency (2002) 103 Cal.App.4th 98, 119).

The level of detail in this section has been guided by what is practical and reasonable, and contains the following elements:

- An analysis of related future projects or planned development that would affect resources in the project area similar to those affected by the proposed project;
- A summary of the expected environmental effects to be produced by those projects with specific reference to additional information stating where that information is available; and
- A reasonable analysis of the cumulative impacts of the relevant projects. An environmental document must examine reasonable feasible options for mitigating or avoiding the project's contribution to any significant cumulative effects.

Due to the statewide reach of the cap-and-trade program, and the potential for offset projects from elsewhere in the U.S., the impact analysis is inherently cumulative in nature rather than site-or project-specific. As a result the character of impact conclusions in the resource-oriented sections of Chapter 4, Impact Analysis, are cumulative, considering the potential effects of the full range of reasonably foreseeable methods of compliance, along with expected background growth in California, as appropriate. The baseline takes into account the reductions achieved by the Scoping Plan measures, so the analysis is inherently cumulative.

This section evaluates the cumulative and growth-inducing impacts associated with implementing cap-and-trade and the potential contribution of the program to those impacts. The impact assessment discusses each resource topic evaluated in this FED.

For purposes of this analysis, cumulative impacts are based on the cap-and-trade program's contribution to environmental impacts in combination with the environmental effects of the ongoing, adopted and reasonably foreseeable Scoping Plan measures, and the State Implementation Plan (SIP), which includes goods movement measures (heavy-duty vehicle efficiency, ship electrification, port drayage truck measures, and vessel speed reduction). The ongoing, adopted and foreseeable Scoping Plan measures are:

Measures In Capped Sectors

Transportation

- T-1 Advanced Clean Cars
- T-2 Low Carbon Fuel Standard
- T-3 Regional Targets (SB 375)
- T-4 Tire Pressure Program
- T-5 Ship Electrification
- T-7 Heavy Duty Aerodynamics
- T-8 Medium/Heavy Hybridization
- T-9 High Speed Rail

Electricity and Natural Gas

- E-1 Energy Efficiency and Conservation
- CR-1 Energy Efficiency and Conservation
- CR-2 Solar Hot Water (AB 1470)
- E-3 Renewable Electricity Standard (20 percent-33 percent)
- E-4 Million Solar Roofs

Industrial Measures

- I-1 Energy Efficiency and Co-Benefits Audits for Large Industrial Sources

Measures In Uncapped Sources/Sectors

H-1 Motor Vehicle A/C Refrigerant Emissions
H-2 SF6 Limits on non-utility and non-semiconductor applications
H-3 Reduce Perfluorocarbons in Semiconductor Manufacturing
H-4 Limit High GWP use in Consumer Products
H-6 Refrigerant Tracking/Reporting/Repair Deposit Program
H-6 SF6 Leak Reduction and Recycling in Electrical Applications
F-1 Sustainable Forests
RW-1 Landfill Methane Control Measure

B. Cumulative Impacts

The cumulative impact analysis determines the combined effect of the proposed project and other closely related, reasonably foreseeable projects. Section 15130 of the CEQA Guidelines indicates that the discussion of cumulative impacts need not provide as much detail as the discussion of effects attributable to the program alone. The level of detail should be guided by what is practical and reasonable.

1. Significance Determinations and Mitigation

Implementation of the cap-and-trade program was determined to potentially result in cumulatively considerable impacts to the resource areas discussed below. While suggested mitigation is provided for each potentially cumulatively considerable impact, the mitigation needs to be implemented by other agencies. Where impacts cannot be feasibly mitigated, the FED recognizes the impact as significant and unavoidable. ARB will need to adopt Findings and a Statement of Overriding Considerations for any significant and unavoidable environmental effects of the approved project. Staff examined the environmental analyses for the Scoping Plan and subsequent Scoping Plan measures that include programmatic impact analysis and mitigation for potentially significant impacts. Relevant information from previous environmental analyses is summarized below. The proposed cap-and-trade program was imbedded in the suite of measures analyzed in the Scoping Plan FED.

2. Cumulative Impacts by Resource Area

a. Aesthetics

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes at existing facilities, and as such would not change the character of the project sites. The ODS Offset Protocol would not introduce activities that would disrupt aesthetic or visual settings. The Livestock Offset Protocol would include the construction of digesters in agricultural settings. Digesters are consistent with agricultural uses and would not represent an adverse change to the visual character of the vicinity. The Urban Forest Offset Protocol would improve the quality of the urban visual environment and would be considered aesthetically beneficial. The Forest Offset Protocol would not increase the

amount of forest activities, but could shift activities to projects that increase carbon sequestration. This shift could change the visual character of offset project sites over time, but would not pose an adverse visual impact.

The RES environmental analysis indicates the construction of renewable energy power plants could result in potentially significant aesthetic impacts. The economic analysis of the cap-and-trade regulation indicates that cap-and-trade would not create incentives for additional development of these power plants beyond the existing influence of RPS and RES. Therefore, the cap-and-trade regulation would not contribute to the cumulative impact.

Low Carbon Fuel Standard (LCFS)

Siting and construction of facilities that support the LCFS may affect view sheds. Because local agencies would approve individual projects, each new facility would be assessed on a location and project-specific basis. Because the expected location of facilities supporting the LCFS would be within existing industrial areas, cumulative aesthetic qualities of the landscape would not be adversely affected.

RPS, Million Solar Roofs, and RES

The siting and construction of wind or solar renewable energy power plants that would support achieving the RPS and RES may affect view sheds, because these are large, utility-scale facilities located in open landscapes, such as the California desert. Careful siting of these facilities could avoid or minimize impacts so that such a project would not substantially affect a scenic vista, damage scenic resources, degrade the existing visual character or quality of the area, or create new sources of light or glare. A utility-scale facility would require a relatively large area, if it is to be used to generate electricity at a commercial scale. Large solar facilities may have numerous highly geometric and sometimes highly reflective surfaces, and may create visual impacts, because they constitute the addition of large constructed facilities within otherwise relatively natural landscapes. Any future development of facilities or infrastructure that would result in a physical change to the visual environment would be subject to the CEQA and/or NEPA process and approval by a city, county or agency on a project-by-project basis. A future facility may ultimately have an adverse aesthetic impact on view sheds, but this depends on the location of a project. There may be increased light glare associated with installation of large arrays of solar panels and the Million Solar Roof initiative measures. Potentially significant impacts to aesthetic values would be likely, and would vary by location, which has been recognized in the RES FED.

b. Agricultural and Forest Resources

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes at existing facilities, and as such would not be expected to impact agriculture or forest resources. The ODS Offset Protocol would not include activities that impact agriculture or forest resources. The Livestock Offset Protocol would include the construction of digesters in agricultural settings. Digesters are consistent with agricultural uses and would not represent an adverse change to agriculture or forest resources. The Urban

Forest Offset Protocol would not impact agriculture or forest resources. The Forest Offset Protocol would not increase the amount of forest activities, but could shift activities to projects that increase carbon sequestration. The Forest Offset Protocol does not include actions that would encourage the conversion of agricultural land to forest.

The LCFS and RES discuss conversion of agricultural land to nonagricultural uses, notably to accommodate new biomass, biofuel, and associated renewable energy facilities. The cap-and-trade program will not contribute to the cumulative conversion of agricultural and forest lands to other uses.

Low Carbon Fuel Standard

While future facilities that support the LCFS may be sited on prime agricultural lands, this is unlikely as prime agricultural land is too valuable to be used to grow crops for biofuel production. If siting of facilities results in the conversion of California's agricultural land, this would be subject to the CEQA process and approval by the city or county on a project-by-project basis. Siting of new stationary sources that convert biomass to fuel may convert prime farmland to other uses – the degree of which would be determined locally, and may conflict with an existing Williamson Act contract. Facilities associated with the LCFS measure would require local approval of conditional use permits, local air permits and possibly waste discharge requirements and would be subject to project-specific compliance with CEQA. Such conversion could be mitigated via a financial throughput mechanism that supports the California Department of Conservation's California Farmland Conservancy Program. Avoidance of siting a facility on Williamson Act contracted land would alleviate potential impacts associated with contract conflicts.

Renewables Portfolio Standard and Renewable Electricity Standard

The siting or expansion of new or existing facilities, and the change of crop from food and fiber to fuel could be potentially significant, depending on a site's soils characteristics and productivity, whether the area has been designated as prime farmland and location or whether a facility is under Williamson Act contract. Mitigation measures include but are not limited to avoidance, supporting California Farmland Conservancy Program or other agricultural easement programs to secure easements, alignment with existing right-of-ways, working cooperatively with land owners in design of project features and providing appropriate financial support to landowners if land is acquired.

c. Air Quality

The proposed cap-and-trade program is designed to reduce GHG emissions. In addition, measures that reduce GHG emissions are expected to provide co-benefit reductions of criteria pollutant and toxic emissions. Statewide, the level of GHG, criteria pollutant, and toxic emissions is expected to be reduced as a result of the cap-and-trade program. This is a beneficial effect.

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes at existing facilities. Construction, grading and trenching have the potential to adversely impact air quality. Recognized measures exist to reduce this potential impact, but the authority to require project-specific mitigation lies with local permitting agencies and not ARB. Consequently, this impact is identified as significant and unavoidable.

There is a possibility that some covered entities might increase operation of specific equipment which could increase local emissions. ARB believes that resulting localized air impacts are extremely unlikely, but cannot say that such increases could never occur. ARB proposes an adaptive management approach to address this impact. This impact is conservatively identified as significant and unavoidable in this FED.

The ODS Offset Protocol and the Livestock Offset Protocol would produce incidental emissions from transportation and construction which would be less than significant. Both of these protocols reduce GHG emissions, considered a beneficial effect and less than significant. Projects implemented under the Urban Forest Offset Protocol would produce incidental emissions that would be less than significant. The Forest Offset Protocol would not alter the level of forest activities and therefore would have a less than significant air quality impact.

Although unlikely, by potentially contributing to localized criteria pollutant or toxic emissions, particularly in communities that are already adversely impacted, or areas designated as nonattainment for these pollutants, the cap-and-trade project could contribute to an existing significant adverse cumulative condition.

Discussion of the potential air quality impacts identified in the analyses for other Scoping Plan measures are presented below.

Low Carbon Fuel Standard

The goal of the LCFS is to reduce the carbon intensity of transportation fuels by at least 10 percent by 2020. Carbon intensity is a representation of the GHG emissions associated with the lifecycle impacts of producing, transporting, and using the fuel.

The variety of options fuel producers can use to meet this standard makes the environmental impact of the LCFS difficult to measure, as it relates to cap-and-trade and the other Scoping Plan measures. A reduction in carbon intensity may not directly relate to a specific change in criteria pollutants or TACs in fuel combustion. The LCFS regulation and staff report contains detailed analysis of the potential air quality impacts that includes the evaluation of the lifecycle GHG emissions and environmental impacts, potential air quality impacts associated with the production, transportation and use of the fuels, and an assessment of the potential localized and cumulative air quality impacts of building in-state production facilities.

Low carbon fuels that may be used to comply with the LCFS include low carbon ethanol and biodiesel, natural gas, electricity, and hydrogen. Potential fuel sources will be

discussed in this evaluation, and potential fuel end uses (e.g. vehicles, energy plants) are discussed under relevant measures in other sectors.

Biofuels

Biofuels is a general term used to describe various fuels produced from renewable sources. These include alcohol fuels, such as ethanol, various types of biodiesel and renewable diesel fuel, and others. Biofuels can be produced from food crops such as corn-derived ethanol or soy beans. Biofuels can also be produced from non-food crops (e.g. switchgrass, algae), biomass waste residues (including cellulosic residues, municipal waste, forest trimmings, etc.), and vegetable oils (often used cooking oils). Biomass produced from waste residue is expected to play a large role in the latter years due to its expected very low carbon intensity. Biofuels can be used to produce blends of conventional fuels (e.g., gasoline and ethanol; biodiesel and diesel fuel; or can be used as essentially 100 percent biofuels). In addition, some processes are designed to produce fuels that can be used to directly replace conventional fuels, such as renewable diesel fuel.

In addition, the federal Energy Independence and Security Act (EISA) of 2007 (which revised the federal Renewable Fuel Standard (RFS)) promotes the production of biofuels, especially advanced renewable biofuels derived from cellulosic and waste sources. The federal RFS established targets for the production of biofuels derived from cellulosic and waste sources. The federal RFS establishes targets for the production of biofuels with a goal of using 36 billion gallons of renewable fuels per year in 2022.

The air emissions associated with acquiring each of these biofuel sources can vary considerably. Some factors that affect the air emissions are described below.

- Recycling of waste materials such as municipal solid waste and green wastes, and agricultural or forest residues to produce biofuels would not typically create a new emission source, and is environmentally preferable to traditional disposal. There are emissions associated with truck trips for collecting these materials, but they most likely do not result in a net increase in co-pollutant or GHG emissions as they would replace disposal-related truck trips.

- Food crop production for biofuels may create new emission sources for acquiring the feedstock. This would not occur if this is merely a redirection of existing food production to fuel production. It is expected that energy crops would not likely be grown to any significant extent in California. Therefore, ethanol derived from corn is limited largely to the volume imported and the need to still meet the original need for importing corn. Biofuel production in California may shift toward the use of waste resources.

- Critical factors in determining air emissions for acquiring the feedstock include where the feedstock is produced (which would impact both other resources

needed for production, as well as rail and other transportation-related emissions), whether the biofuel crop is replacing another type of crop (and the difference in air emissions associated with the two crops), and whether the crop is competing with food crops for land. Crop production requires the use of off-road equipment, application of fertilizers and pesticides, and irrigation water. Air emissions from fertilizers and pesticides as well as run-off into streams, rivers and lakes result from traditional agricultural practices. Each of the biofuel production approaches mentioned above has associated air emissions. There are NO_x, volatile organic compounds (VOCs), and PM emissions associated with agriculture, as well as emissions associated with truck trips to transport raw material to intermediate processing facilities.

- Non-food crop production for biofuel productions (e.g., energy crops) uses plants that are less resource-intensive (requiring less fertilizer and water), and thus have lower associated air pollutant emissions. The associated truck trip emissions would be expected to be similar to truck trip emissions from food crop production.

Biofuel production on a commercial scale would require development of new technologies as well as production of biofuels using conventional biofuel production technology and crop-derived feedstocks. Currently, the production capacity of commercial-size biofuel (ethanol and biodiesel) plants ranges from approximately 30 million gallons to 100 million gallons per year.

Production facilities that may be located in California would be dependent on the availability of feedstocks. These would likely be non-crop feedstocks and would include biomass wastes from forestry, municipal solid wastes, agriculture wastes, and waste oils, or would be food crops (i.e., corn) imported from the Midwest. There is competition for certain wastes for use in production of renewable electricity and biomethane. For example, it is expected that most of the forest waste would go to production of renewable electricity and municipal solid waste to produce biomethane, or be converted directly to electricity.

Biofuels would be available to replace both gasoline and diesel with the split between the two fuel types difficult to quantify at this time. In consideration of the competition between potential uses, California biofuel production could reasonably be in the range of 300 million gallons to 1 billion gallons per year. This could result in 10 to 30 new biofuel facilities in California, in addition to existing facilities. Note that projections of fuel production would likely change since the use of biofuels (biofuels and ethanol) would be partially driven by the federal EISA as discussed above.

Biodiesel production plants tend to be located close to their feedstocks and secondarily close to rail yards or freeways for distribution to retail sites. Ethanol facilities tend to be located near rail or truck terminals. Siting may also consider proximity to the feedstocks or the users of ethanol co-products. Current biodiesel production facilities are small, ranging from a thousand gallons per year to 30 million gallons per year.

The conversion of biomass feedstocks into energy can result in air quality impacts. Criteria air pollutants and TACs, as well as GHG emissions, would need to be assessed for these facilities during the siting and permitting processes. The pollutants of most concern associated with biomass conversion processes are NO_x NO_x and VOCs; both are important precursors to the formation of ozone and PM. PM emissions, especially from handling feedstocks, also need to be addressed. GHG emissions would also need to be considered as part of the siting process and would ultimately be included in the AB 32 process. Finally, any localized criteria air pollutant or TAC emission impacts must be considered in the context of localized and cumulative impacts, and impacts on environmental justice concerns.

Natural gas

The GHG emissions from natural gas depend on where it is produced and how it arrives to the final user. The emissions also would vary depending on the form supplied to vehicles either as compressed or liquefied natural gas. Any new distribution facilities including compressors, product quality processors, and liquefaction equipment would have to be permitted and any associated emissions or environmental impacts mitigated.

Hydrogen

Depending upon how it is produced, hydrogen can be a low carbon fuel. As a transportation fuel, hydrogen can be used in either modified internal combustion engines or in fuel cells. Unlike the burning of carbon-based fuels which produce CO_2, CO, NO_x NO_x, VOC and PM and other potentially toxic compounds, combusting hydrogen produces heat, water, and some NO_x NO_x. Hydrogen-fueled fuel cell vehicles only produce heat and water vapor.

Like other fuels, hydrogen must be examined over the entire process chain, including the energy needed to produce the fuel as well to compress or cool the hydrogen for storage. Potential hydrogen production methods include electrolysis of water, steam reformation of natural gas, biomass gasification and coal gasification. Today, the two most common ways to produce hydrogen are steam reformation of natural gas and electrolysis of water. Hydrogen produced using electricity generated from renewable resources and used to power fuel cell vehicles results in extremely low air emissions. SB 1505 (Lowenthal, Chapter 877, Statutes of 2006) directs ARB to develop environmental regulations for the production of hydrogen for transportation use, a process that started in late 2007.

Electricity

Increasing the number of electric vehicles and plug-in hybrids would substantially lower the carbon intensity of transportation fuels. The co-pollutant emissions associated with electricity as a transportation fuel are expected to be the same as the co-pollutant emissions associated with electricity overall. An increase in the number of electric vehicles and plug-in hybrids would not adversely impact air quality. Off peak loads would increase significantly as grid-rechargeable electric vehicle penetration increases. This increased load would produce some increase in GHGs and co-pollutants from base

load plants. Such increases in criteria pollutants and GHG would be more than offset however, by the displacement of internal combustion vehicles.

Goods Movement Efficiency Measures

The Goods Movement Emissions Reduction Plan (GMERP) identifies opportunities to improve the efficiency of goods movement, particularly through tracking and better scheduling of activities. The proposed measure adds to this concept by proposing that efficiencies to reduce GHG emissions also be considered. Although the following strategies are not likely to adversely impact air quality, further evaluation is needed to verify whether specific mitigation measures are needed.

Clean (Green) Ships:

This measure proposes to incentivize increased fuel efficiency of ships, such as improving engine efficiency, as well as other technologies that reduce GHGs and NO_x, and is also included in the 2007 SIP. A voluntary program to reduce vessel speeds at the Ports of Long Beach and Los Angeles may be expanded to ocean going vessels that travel along the State's coastline. The employment of wind assistance is also being explored. No adverse impacts to air quality are anticipated, but the measure is not fully developed at this time.

Commercial Harbor Craft:

This SIP measure would develop BMPs and outreach to encourage regular maintenance, the use of non-toxic antifouling materials, vessel speed reduction, and engine efficiency of commercial harbor craft. Air emission reductions have not been quantified, but the main intention is to reduce criteria pollutants and TACs, thus improving air quality.

Cargo Handling Equipment:

This SIP measure would reduce the idling times of diesel-powered equipment that could reduce associated criteria pollutants.

Transportation Refrigeration Units:

This measure would limit the use of internal combustion engine-driven refrigeration system that is used at any facility, including grocery stores and distribution centers, for extended cold storage. The measure would encourage more energy-efficient operations that reduce emissions of GHGs from internal combustion engine-driven refrigeration systems. Use of electrically-driven refrigeration systems, cryogenic refrigeration, or adequately sized cold storage facilities would be encouraged.

Energy Efficiency and Conservation Measures

Solar water heating and solar roofs that collectively reduce peak demand are likely to reduce air emissions, as aging, less efficient power plants are more likely to be operated when demand is high. Thus, no adverse air quality impacts are anticipated for energy efficiency and conservation measures.

Increasing Combined Heat and Power

Combustion-based power plants do not convert all of their available energy into electricity and typically lose more than half of the energy as excess heat. At the same time, there are many industrial facilities that require both electricity and heat which currently purchase electricity from the grid and burn natural gas to generate heat. CHP systems generate both electricity and thermal energy on site. When the systems are optimally sized to either meet the heat load of the industrial facility or provide the maximum amount of electricity that the facility could use during peak demand, excess electricity is produced that could be distributed to other electricity users.

Renewables Portfolio Standard and Renewable Electricity Standard

These measures would increase the overall percentage of renewable energy sources such as wind, solar, biomass and geothermal, of each utility's energy sources. Currently, California's energy profile includes about 12 percent renewable sources. The requirement to increase renewable energy could be met through any potential mixture of renewable energy sources, and would most likely be driven by a number of factors, including the availability of renewable sources within the geographic region of each utility. For these reasons, the impacts of each of the renewable resources are evaluated relative to electrical grid natural gas, and are not individually quantified for potential air emissions.

There are air quality impacts associated with the construction of facilities to harness renewable resources – primarily from fugitive dust and diesel particulates from operation of construction equipment. These are assumed to be similar in nature to the construction-related emissions from natural gas-powered power plants, although the location and size of facilities can affect the magnitude and duration of these impacts. These impacts may be temporarily significant, and would be mitigated by employment of BMPs to minimize dust. ARB's implementation of the Diesel Risk Reduction Plan includes reducing diesel particulates from construction equipment operation by 2020, and compliance with this regulation would help mitigate adverse impacts associated with construction.

Wind and solar energy

Wind and solar energy would not adversely impact air quality. Wind power operation and solar energy do not have any associated air emissions.

Biomass

Biomass energy is harnessed through the combustion of organic waste materials, residuals or agricultural products. Air emissions from biomass sources depend on the fuel type. These are also indirect emissions associated with the production, transportation, and/or disposal of the fuel source.

Biomass (forest or agricultural residuals) or municipal solid waste (MSW) may be pre-processed and then combusted to generate electricity. Biomass combustion must be controlled to limit emissions of NO_x NO_x, PM and carbon mo NO_xide, as biomass combustion generates 17 times the amount of NO_x NO_x and 27 times the amount of PM

as electrical grid natural gas power plants per MWH. Estimates are based on renewable power generation emission factors developed from ARB surveys and emission inventories in 2000-2001, conducted during the California electricity crisis. MSW combustion must also be controlled to limit emissions of NO_x, PM and carbon mo NO_xide, as MSW combustion generates 24 times the amount of NO_x and 5 times the amount of PM as electrical grid natural gas power plants (per MWH). In some areas of the state, agricultural residuals are burned in open fires as a means of disposal. If the residuals used in a biomass plant were disposed of in open fires, burning the residuals in a biomass plant would reduce the air emissions while also producing electricity. All of these emissions can be minimized with modern control technologies and through good plant design.

Biogas

The anaerobic digestion of human or animal waste produces a gas of 50 to 80 percent methane. This "biogas" can be combusted to produce electricity. Combustion of digester gases must also be controlled to limit emissions of NO_x, PM and carbon mo NO_xide, as MSW combustion generates 22 times the amount of NO_x and 9 times the amount of PM as electrical grid natural gas power plants (per MWH).

Combustion of landfill gases (mostly methane) to produce electricity puts methane to use that would otherwise be flared to control the methane emissions. Combustion is also used to reduce the TACs associated with some landfills. Combustion of landfill gases must be controlled to limit emissions of NO_x, PM and carbon mo NO_xide, as its combustion generates 27 times the amount of NO_x and 7 times the amount of PM as electrical grid natural gas power plants (per MWH). All of these emissions can be minimized with modern control technologies and through good plant design.

Geothermal

Geothermal energy harnesses naturally occurring geothermal formations, using the steam to produce electricity and returning spent brine to the geothermal resource. Emissions associated with geothermal sources can include H_2S, arsenic, mercury, radon 22, and NH_3. The cooling towers at geothermal power plants can emit PM. All of these emissions can be minimized with modern control technologies and through good plant design.

Hydroelectric

Hydroelectric power uses the potential energy of water to turn turbines that generate electricity. These types of projects do not have associated air emissions.

The addition of significant new renewable resources may also alter the needed transmission infrastructure as renewable facilities are constructed to maximize resource capture at sites with optimal wind, solar, and geothermal resources. ARB has not evaluated the air quality impacts of changes or additions to transmission infrastructure, but notes that there is an ongoing process to examine this issue for several western states and provinces – the Renewable Energy Transmission Initiative (RETI). The RETI is also prioritizing the addition of specific renewable projects to optimize the efficiency

and minimize the environmental impact of new transmission infrastructure. There are no long-term air emissions associated with transmission lines, but there are short-term co-pollutant emissions associated with construction that can be minimized through best practices and project design. All of these emissions can be minimized with modern control technologies and through good plant design.

Landfill Methane Control

The implementation of a Landfill Methane Control protocol involves installation of control devices such as flares and energy recovery systems in order to further reduce GHG emissions caused by CH_4. These activities may slightly increase criteria pollutant emissions such as NO_x and carbon mo NO_xide (CO) above current levels. Measureable but variable amounts of toxic compounds such as benzene, vinyl chloride, and other carcinogens may be detected in landfill gas at some facilities. To mitigate, any increase in the generation of NO_x and CO as a result of landfill gas combusting would need to be included by the affected district in its emission inventory, and depending on a district's non-attainment status, offsets may be required, typically for landfill gas-to-energy projects. This measure does not require the installation of gas-to-energy projects. Gas collection systems with flares or other combustion devices are currently the best means of reducing CH_4 and the potential risk to surrounding populations.

d. Biological Resources

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes at existing facilities. Construction, grading and trenching have the potential to adversely impact any protected biological resources that might exist at those locations. Recognized measures exist to reduce this potential impact, but the authority to require project-specific mitigation lies with local permitting agencies and not ARB. Consequently, this impact is identified as significant and unavoidable. The ODS Offset Protocol would not include activities that potentially impact biological resources. The Livestock Offset Protocol would include the construction of digesters at or adjacent to existing livestock operations where natural habitats are expected to be absent or limited. As such, the Livestock Offset Protocol would result in less than significant impacts to biological resources. The Urban Forest Offset Protocol recognizes tree improvement projects in urban settings, and as such would not be expected to significantly affect biological resources. The Forest Offset Protocol would not increase total forest activities, but could shift activities to projects that increase carbon sequestration. This shift could change the habitat of offset project sites over time. ARB will implement adaptive management to monitor this impact. This impact is considered significant and unavoidable.

Discussion of the potential impacts the biological resources that are expected to occur as a result of implement of other Scoping Plan measures are presented below. The LCFS and RES discuss biological impacts resulting from siting and construction of biomass, biofuel, and other renewable energy facilities. The cap-and-trade program has the potential to produce relatively incidental, but unavoidable, impacts to biological resources on industrial sites. The Forest Offset Protocol would contribute to a long-term

change in forest habitat which, although viewed as potentially beneficial, could adversely impact individual species. Consequently, the cap-and-trade program would contribute to a cumulatively significant impact to biological resources. Discussion of the impacts to biological resources identified in the analyses for other Scoping Plan measures is presented below.

Low Carbon Fuels Standard

When converting natural lands or farmlands to industrial or a utility-scale facility, such as an ethanol facility, any adverse impacts are required to be addressed and mitigated through CEQA. These impacts could be to terrestrial, riparian, or aquatic habitat, natural communities, or to any species identified as a candidate, sensitive or special status species in local or regional plans, policies or regulations, or by CA. DFG or U.S. FWS, or §404 of the Clean Water Act. A facility may interfere with the movement of any native resident or migratory fish or wildlife species with established migratory corridors, or it may conflict with the provisions of an adopted Habitat Conservation Plan or other approved local, regional or state habitat conservation plan.

In addition, the refining, marketing and distribution of petroleum fuels may adversely impact water quality due to leaks, spills, and wastewater discharge. These water quality impacts can also impair important habitat, or interfere with critical life-cycles of native species. Any reduction in petroleum fuel use would reduce the opportunity for such occurrences.

Some biofuel feedstocks have the potential to affect native species and biological resources, if feedstocks are produced though conversion of important habitat to agriculture or increase agricultural activities in species' corridors. Hydrogen production and use should have little or no affect on native species and biological resources outside of any potential effects from its energy and water source. CEQA and possibly NEPA compliance would be required for each facility with its project-specific environmental evaluation.

Renewables Portfolio Standard and Renewable Electricity Standard

Siting of new utility scale facilities and arrays may convert natural lands to other uses – the degree of which would be determined locally. Any utility scale facility may require a relatively large area if it is to be used to generate electricity at a commercial scale, and large arrays of solar collectors may interfere with natural sunlight, rainfall, and drainage which could have a variety of effects on plants and animals. Solar arrays may also create avian perching opportunities that could affect both bird and prey populations. A wind farm may present a potential risk to migrating birds if the facility is sited in a flyway. Careful siting and design of such a facility would minimize the risk for bird strikes.

Of note, a solar thermal plant requires around 50 times more land than combined cycle natural gas fueled power plant per MW. Construction activities associated with solar thermal plants disturb the land, and fencing can interfere with wildlife corridors. NO_2 and PM deposition from cooling towers at solar thermal plants and new geothermal projects may also degrade vegetation.

When converting natural lands to industrial or usage for utility-scale facilities, there may be adverse impacts to terrestrial, riparian, or aquatic habitat, natural communities, or on any species identified as a candidate, sensitive or special status species in local or regional plans, policies or regulations, by DFG, U.S. FWS, or Section 404 of the Clean Water Act. A facility may interfere with the movement of any native resident or migratory fish or wildlife species with established migratory corridors, or it may conflict with the provisions of an adopted Habitat Conservation Plan or other approved local, regional or state habitat conservation plan.

Specific information will be included as the measures and regulations are further developed; each regulation is required to have its own environmental evaluation. CEQA and possibly NEPA compliance would be required for each facility with its project-specific environmental evaluation. Such facilities would require a local approval of conditional use permits, and other permits and would be subject to project-specific compliance with CEQA and NEPA, as appropriate.

e. Cultural Resources

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes at existing facilities. Construction, grading and trenching have the potential to adversely impact any cultural resources that might exist at those locations. Recognized measures exist to reduce this potential impact, but the authority to require project-specific mitigation lies with local permitting agencies and not ARB. Consequently, this impact is identified as significant and unavoidable. The ODS Offset Protocol would not include activities that potentially impact cultural resources. The Livestock Offset Protocol would include the construction of digesters at or adjacent to existing livestock operations where cultural or historic features could exist. Similarly, the Urban Forest Offset Protocol includes projects in urban settings where cultural and historic resources could exist. Although recognized mitigation measures exist to reduce these potential impacts, the authority to require project-specific mitigation lies with local permitting agencies and not ARB. Consequently, these impacts are identified as significant and unavoidable. The Forest Offset Protocol could change the type of forest projects that are undertaken, but would not alter the overall level of forest activities, and as such would not increase potential impacts to cultural resources. This impact would be less than significant.

CEQA and/or NEPA regulations require evaluation and mitigation of potential impacts to cultural resources. Compliance with CEQA and NEPA regulation was assumed in the RES and LCFS environmental analyses, and consequently, those evaluations do not identify a cumulative impact to cultural resources. However, it is generally accepted that land disturbance has the potential to adversely impact cultural sites and contribute to the cumulatively significant disturbance and/or destruction of cultural resources. The cap-and-trade compliance response that includes construction of ancillary structures and outbuildings, and livestock digester offset projects, could contribute to the existing cumulative disturbance and/or destruction of cultural resource sites.

f. Energy Demand

Implementation of the cap-and-trade program would reduce energy demand, representing a beneficial effect. The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes. These actions will reduce overall energy demand and are considered beneficial effects. Projects implemented under the compliance offset protocols will not increase energy demand, and as such pose no impacts or less than significant impacts to energy demand.

Economic modeling for the cap-and-trade program indicates that statewide energy demand is expected to decrease as a consequence of increased energy efficiency. The cap-and-trade program would overall result in reduced energy demand and would not contribute to an adverse cumulative impact. Discussion of energy impacts from the analyses for other Scoping Plan measures is presented below.

Low Carbon Fuel Standard

Future ethanol and other biofuel production facilities in California would likely use natural gas to produce steam and purchase required electricity from a utility. Mitigation would include employment of efficiency and control technologies at facilities and the purchase of offsetting credits. Energy may also be required to move additional natural gas through the pipelines, although this is expected to be minor as the supplies would likely come from existing supplies of natural gas.

Increasing the number of electric vehicles and plug-in hybrids would substantially lower the carbon intensity of transportation fuels, but has the potential to increase electricity demand in the long term. Employment of off-peak charging strategies would mitigate to a substantial degree.

Ship Electrification at Ports

Allowing ships to run heating, air conditioning, lights, and other operations by plugging into shore-side electrical power would reduce emissions by allowing ships to shut down the uncontrolled auxiliary engines that traditionally have powered these electric-based activities. According to the 2007 SIP, there are TACs associated with incremental electricity generation at power plants, but they are significantly less than emissions generated by ship engines. This regulation was evaluated for adverse environmental impacts.

Goods Movement

Truck refrigeration units may increase energy demand through electrification of units. Employment of off-peak charging would reduce this impact.

g. Geology, Soils and Mineral Resources

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes at existing facilities. Construction, grading and trenching have the potential to result in adverse soil erosion, dust generation, and sedimentation of local waterways.

Recognized measures exist to reduce this potential impact, but the authority to require project-specific mitigation lies with local permitting agencies and not ARB. Consequently, this impact is identified as significant and unavoidable. The ODS Offset Protocol would have no impacts on geology, soils and mineral resources. The Livestock Offset Protocol would include the construction of digesters that would be subject to regulations considered sufficient to mitigate potential impacts to geology, soils and mineral resources to a less than significant level. The Urban Forest Offset Protocol would result in only minor soil disturbance and would not be expected to adversely impact geology, soils or mineral resources. This impact would be less than significant. The Forest Offset Protocol would not increase total forest activities, but could shift activities to projects that increase carbon sequestration. Because the overall level of forest activities would not change, this impact would be less than significant.

Although identified as significant and unavoidable for an individual project, grading and trenching to accommodate ancillary structure or outbuildings would not contribute to an adverse cumulative geology and soil impact. Soil disturbance impacts are commonly addressed on a site-specific level and are not recognized to aggregate, resulting in a cumulative impact.

h. Greenhouse Gases

Implementation of the cap-and-trade program would improve air quality. ARB estimates the 2010 GHG emissions baseline to be 462 $MMTCO_2e$. The existing conditions projected to 2020 are estimated to be 507 $MMTCO_2e$. As of 2010, there are 21 ongoing or adopted AB 32 Scoping Plan measures that would achieve an estimated 58 $MMTCO_2e$ reductions by 2020, and one foreseeable measure (Advanced Clean Cars) that would reduce approximately 4 $MMTCO_2e$, resulting in 2020 statewide emissions of 445 $MMTCO_2e$. The AB 32 emissions reduction target is 427 $MMTCO_2e$. The proposed cap-and-trade regulation would need to reduce 18 $MMTCO_2e$, i.e. the balance needed to reach the 427 $MMTCO_2e$ target if all of the Scoping Plan measures achieve their expected reductions. If any measures are less effective than envisioned, cap-and-trade would need to achieve greater reductions to make up any shortfall. This is considered a beneficial effect and would not contribute to an adverse cumulative condition.

i. Hazards and Hazardous Materials

Implementation of the cap-and-trade program would not result in actions that would result in potentially significant adverse impacts related to hazards or hazardous materials. The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes at existing facilities. The use of hazardous materials is common practice in industrial settings. Implementation of compliance responses could include the use of hazardous materials, but this would be considered simply an extension of business as usual for most covered entities, mitigated by existing practices and regulations, and thus considered less than significant. Offset projects implemented under the proposed offset protocols may result in the use or transport of hazardous materials that require special

handling and disposal. All projects would be required to comply with established local, state, and federal laws pertaining to the use, storage, and transportation of these materials. Assuming compliance with applicable laws and regulations, the impacts would be less than significant.

The cap-and-trade program would not contribute to a cumulative adverse impact related to hazards or hazardous materials. Discussion of the use of hazards and hazardous materials from the analyses for other Scoping Plan measures is presented below.

Low Carbon Fuel Standard

Hazardous materials and wastes are a part of fuel production and other actions associated with LCFS.

Biodiesel

Biodiesel production uses sodium hydroxide, hexane, sulfuric acid, and methanol. These would be present in any waste generated. Stearates are also likely generated during the esterification process. Glycerol is a co-product that contains unused catalyst, salt, water, methanol, and soaps, and may be recycled and has economic value.

Ethanol

Current state-of-the-art dry milling plants are expected to generate minimal waste, but any waste materials such as hydraulic oil that is generated would require appropriate disposal if they cannot be, reused or reprocessed.

Hydrogen

Precious metals, such as platinum, are expected to be recovered from fuel cells at the end of their useful life. Carbon fiber used in hydrogen tanks is highly valuable as a recycled material.

Goods Movement Efficiency Measures

These measures are not expected to affect waste disposal or hazardous materials, as they do not propose to significantly materially change vehicles, vessels, structures, or equipment. Reduced upstream transport of fuels would reduce the potential for accidental spills.

One maintenance practice considered in the commercial harbor craft includes the use of non-toxic anti-fouling products to be used on the hulls of water craft to improve hull smoothness. Copper is an active ingredient in some commonly used anti-fouling products. Excess product, spray mixture, and rinseate associated with the application of copper-containing anti-fouling products must be treated and disposed of as hazardous waste if it cannot be used or chemically reprocessed. The encouragement of entities to use non-toxic anti-fouling products and education of owners/operators on the toxicity of copper could reduce the use of and improper disposal of these chemicals.

Energy Efficiency and Conservation

Appliance and building efficiency standards are designed to reduce energy and water consumption. Overall the appliance and building turnover rate would not result in an accelerated rate of hazardous or municipal solid waste production. Efficiency standards occasionally result in the use of new or new versions of products that contain hazardous materials and require special recycling or disposal, such as ballasts in compact fluorescent bulbs or batteries. Compliance with special waste handling, recycling and disposal laws and regulations would eliminate potential impacts.

Renewables Portfolio Standard and Renewable Electricity Standard

Municipal solid waste may contain hazardous materials, which could result in solid and gaseous hazardous by-products when burned for energy. Ash can be recycled or shipped to landfills permitted to accept such waste, and hazardous materials should be diverted prior to combustion. Solar arrays with photovoltaic panels may contain hazardous materials, and although they are sealed under normal operating conditions, there is the potential for environmental contamination if they were damaged or improperly disposed upon decommissioning. Concentrating solar power systems may employ liquids such as oils or molten salts that may be hazardous and present spill risks. Spill-related impacts can be mitigated through proper planning, handling, spill cleanup, and adherence with disposal protocols (Federal Register/ Vol. 73, No. 104, Notices, May 29, 2008).

Million Solar Roofs

As indicated above, photovoltaic panels may contain hazardous substances and there is the potential for environmental contamination if they were damaged or improperly disposed upon decommissioning. Some solar cell manufacturing requires trace amounts of potentially toxic materials. Proper handling and operation and good maintenance practices can be used to minimize impacts from hazardous materials. (Federal Register/ Vol. 73, No. 104, Notices, May 29, 2008).

j. Hydrology and Water Quality

Implementation of the cap-and-trade program has the potential to adversely impact hydrology and water quality. The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes at existing facilities. Construction, grading and trenching have the potential to result in adverse soil erosion resulting in sedimentation and degradation of local waterways. Recognized measures exist to reduce this potential impact, but the authority to require project-specific mitigation lies with local permitting agencies and not ARB. Consequently, this impact is identified as significant and unavoidable. The ODS Offset Protocol would have no adverse impacts on hydrology and water quality. The Livestock Offset Protocol would include the construction of digesters that would be subject to regulations which are considered sufficient to mitigate potential impacts to hydrology and water quality to a less than significant level. The Urban Forest Offset Protocol would result in only minor soil disturbance resulting in less than significant impacts to hydrology or water quality. The Forest Offset Protocol would not increase total forest activities, but could shift activities

to projects that increase carbon sequestration. Because the overall level of forest activities would not change, the potential to adversely impact hydrology and water quality would not change. This impact would be less than significant.

The compliance responses identify potential adverse impacts to water quality, notably sedimentation from improperly protected construction sites. Degradation of water quality is not recognized as a cumulative adverse condition in other Scoping Plan environmental analysis. However, many streams and water bodies are designated as water quality impaired. It is possible that some of the existing facilities, and offset project sites, could be located in the watersheds of impaired water bodies. Consequently, the implementation of compliance responses and offset projects could contribute to an existing cumulative adverse water quality conditions. The impact is considered significant and unavoidable. Discussion of the hydrology and water quality impacts from the analyses prepared for other Scoping Plan measures is presented below.

Low Carbon Fuel Standard

ARB compared the potential water resources effects of the LCFS to traditional petroleum fuels.

Biofuels

Water demand will be an important consideration in determining the kind of fuel that may be produced in the State. Based on water demand information related to the LCFS, ARB staff estimated that a range from 2 to 6 gallons of water is used to produce 1 gallon of ethanol, compared to 1 gallon of water necessary to produce one gallon of biodiesel (Pate and Hightower, 2007). The source of water is also important. Wastewater from biorefineries can contain high levels of biological oxygen demand (BOD), grease and salts, and may not be appropriate for use unless treated prior to application.

The greatest potential impact on water resources by biofuels is the production of feedstock. Agriculture in the United States relies on a mixture of natural rainfall and irrigation, the ratio of which depends on the local climate. Irrigation practices can have a very large effect on the overall water consumption by biofuels. Just as irrigation water demand is highly dependent on location, so is the impact of that water demand. In addition to water demand, the chemicals and fertilizers used on these crops can end up in surface or ground waters, effecting water quality.

The location of these water demands determines their ultimate effect. In the Midwest, where much of the corn and soy beans are grown, historic overdraw of groundwater resources and high organic loading of surface waters would suggest that the additional water demand of biofuel production and increase N_2 loading of feedstock production could impact existing water resources.

In addition, there may be potential adverse impacts to water quality from different formulations of low carbon fuels in the event of spills. Depending on formulation,

potential for biological effects from fuels such as ethanol, biodiesel, renewable diesel and others exist, in the event that there is a discharge to groundwater or surface waters. For example, ethanol may delay biological degradation of benzene, toluene, ethylbenzene and xylene (BTEX) due to bacterial preference for ethanol (2007 SIP). Compliance with SWRCB regulations would avoid or minimize this impact. Also, employment of appropriate spill prevention and spill abatement protocols would alleviate the impact.

Finally, chemicals and fertilizers used on crops used to produce fuel can end up in surface or ground waters, affecting water quality. Mitigation measures such as minimizing use, or use of post fumigation water treatments would protect surface water quality.

Hydrogen

Hydrogen fuel can be created from water (through electrolysis) or from hydrocarbon sources such as natural gas, methanol, or petroleum products (steam reforming). Steam reformation of natural gas is the most common form of hydrogen production in the United States. Each of these processes uses water: in electrolysis energy is used to break apart water bonds to create hydrogen, in reforming steam is used to break apart hydrocarbon bonds. The consumptive water resource requirements for these processes are not well documented, but given the pressures on California's water supplies, these impacts should be evaluated during the siting process for hydrogen production facilities.

k. Land Use and Planning

Implementation of the cap-and-trade program has the potential to result in a significant adverse impact to land use and planning. The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes at existing facilities, and as such would be consistent with the existing uses and pose a less than significant land use and planning impact. The ODS Offset Protocol would use existing facilities, representing a less than significant impact to land use and planning. The Livestock Offset Protocol would allow the construction of digesters in agricultural settings. Digesters are a consistent use in agricultural areas. As such, their construction would not conflict with existing land use plans, and thus would be a less than significant impact. Projects implemented under the Urban Forest Offset Protocol would not conflict with land use plans, resulting in a less than significant impact. The Forest Offset Protocol includes avoided conversion projects that could conflict with local land use plans that envision development or other uses of forested areas. This potential conflict would be considered a significant and unavoidable impact.

Land use and planning impacts are not recognized as actions that aggregate to create cumulative conditions. As such, the proposed cap-and-trade will not contribute to an adverse cumulative land use and planning impact. Discussion of the hydrology and water quality impacts from the analyses prepared for other Scoping Plan measures is presented below.

Regional Transportation-Related Greenhouse Gas Targets

Metropolitan planning organizations (MPOs) are required to meet transportation-related GHG emissions reduction targets set by ARB. Achieving significant additional GHG reductions from changed land use patterns and improved transportation would help achieve the goals of AB 32. While worth noting that this emissions reduction is significant, it is not adverse. The change in land use policies through building on successful Blueprint planning processes and requiring MPOs to develop and incorporate sustainable communities strategies would improve transportation would present overall benefit to communities in the state. Also, many counties would likely adopt GHG Elements in their General Plans that translate into updated building codes, energy and water use efficiency measures, and land use decisions. These actions may result in new or revised permitting requirements. Permit approval generally requires compliance with CEQA (or its functional equivalent) and possibly NEPA.

Low Carbon Fuel Standard

There would be potential land resource issues associated with the biofuels pathways, such as conversion of forestlands, pastureland, and food or fiber to fuel crops. The local jurisdiction having land use authority over such conversion would review and consider the potential impacts due to conversion on a project-specific basis. Potential land use impacts could occur if non-compatible areas are rezoned to accommodate the siting of new production facilities.

Renewables Portfolio Standard and Renewable Electricity Standard

Siting of new utility-scale facilities and arrays may conflict with an existing Williamson Act contract, or lands under easement. Avoidance would be the most appropriate mitigation. If land is under easement, the easement conditions must allow such a use. Such facilities may require a local approval of conditional use permits, and other permits and would be subject project-specific compliance with CEQA and/or NEPA.

I. Noise

The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes. Construction has the potential to introduce short-term noise levels that would exceed acceptable ambient levels. Because of the short-term nature of construction, and the industrial setting in which these noises would occur, this impact would be less than significant. Recognized measures exist that are implemented as standard practice to minimize construction noise. The ODS Offset Protocol would not result in significant adverse noise impacts and is identified as less than significant. The Livestock Offset Protocol would allow the construction of digesters in agricultural settings. Construction of digesters could adversely impact sensitive receptors and is considered a significant and unavoidable impact. Recognized measures exist to reduce this potential impact, but the authority to require project-specific mitigation lies with local permitting agencies and not ARB. Consequently, this impact is identified as significant and unavoidable. Projects implemented under the Urban Forest Offset Protocol would not produce unacceptable noise levels and is considered a less than significant impact. Projects implemented under the Forest Offset Protocol would occur in forested areas. Forest

projects would produce elevated noise levels that exceed accepted ambient levels. However, adoption of the Forest Offset Protocol would not alter the extent of forest activities, but would simply shift some activities to projects that sequester carbon. Because the level of overall forest activities would not change, the consequential noise impacts would not change. Thus, this impact is considered less than significant.

Except in the context of other local activities that impact the same area, noise impacts are not recognized as actions that aggregate to create cumulative conditions. As such, the proposed cap-and-trade will not contribute to an adverse cumulative noise impact. Discussion of noise impacts from the analyses prepared for other Scoping Plan measures is presented below.

Renewables Portfolio Standard and Renewable Electricity Standard

Power plants and wind power installations may increase noise levels. General Plan Noise Elements and ordinances identify appropriate noise levels. Accepted mitigation measures may vary by facility type. Limited hours of operation, mufflers, and sound barriers would mitigate the majority of construction and operational noise impacts.

m. Employment, Population and Housing

The cap-and-trade program, including the proposed compliance offset protocols and associated offset projects would not result in significant adverse impacts to employment, population, or housing. All impacts to population, employment, and housing would be less than significant. Cap-and-trade as a whole could incrementally contribute to the continuing shift to green industries that is largely attributed to RPS, RES, LCFS and AB 32 Scoping Plan measures. This shift is creating new jobs in emerging green industries.

Implementation of the cap-and-trade project would not contribute to a significant cumulative change in employment, population and housing.

n. Public Services

The cap-and-trade program, including the proposed compliance offset protocols and associated offset projects would not result in adverse impacts to public services. All potential impacts to public services would be less than significant. The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes. These projects would not increase the level of public services beyond that already provided to existing facilities. The ODS Offset Protocol, the Livestock Offset Protocol, and the urban forest protocol and associated projects would not result in a need for an increased level of public services beyond that already provided to existing facilities. The Forest Offset Protocol would not alter the extent of forest activities, but would shift some activities to projects that sequester carbon. Because the level of overall forest activities would not change, the consequential need for public services would not change. Thus, this impact is considered less than significant, and the proposed cap-and-trade program will not contribute to an adverse cumulative impact to public services.

o. Recreation

The cap-and-trade program, including the proposed compliance offset protocols and associated offset projects would not result in adverse impacts to public services. All potential impacts to public services would be less than significant. The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes. These actions would have a less than significant impact on recreation resources. The ODS Offset Protocol, the Livestock Offset Protocol, and the urban forest protocol and associated projects would result in a less than significant impact on recreation resources. Forest management activities could disrupt opportunities for forest recreation, but such disruptions exist under current conditions. Offset projects developed under the proposed offset protocol would include the construction of roads, temporary closures for tree installation and periodic increases in truck or construction equipment traffic that could disrupt recreational activities, but forest projects developed under the Forest Offset Protocol would occur on land that was historically forested or currently forested, and consequently, the overall impact to recreational resources would be less than significant.

As discussed in the environmental analyses for other Scoping Plan measures, construction of renewable energy projects, notably large solar and wind farms, would result in potentially significant impacts to recreation on public lands. The economic analysis of the cap-and-trade regulation indicates that the program would not introduce incentives for additional development of such facilities beyond that already posed by RPS and RES. Therefore, the cap-and-trade regulation would not contribute to any adverse cumulative impact to recreation.

p. Transportation and Traffic

Implementation of covered entity compliance responses is not expected to result in significant adverse impacts to transportation or traffic. If a facility expands or requires construction to take place, increases in construction traffic would be temporary and considered less than significant. Activities undertaken to develop offset projects would be expected to vary according to the type of offset project. The amount of activity would fluctuate depending on the particular type, number and duration of use and the phase of construction. Construction traffic impacts can be mitigated through ingress and egress controls, traffic controls, and reduced speed zones to ensure safety. Transportation and traffic impacts resulting from the implementation of ODS, Livestock and Urban Forest Offset Protocol projects would be less than significant. Construction of livestock digesters could require the operation of heavy equipment on rural roads, resulting in safety concerns which are identified as significant and unavoidable. Transportation and traffic impacts would not be expected to contribute to a cumulatively significant adverse impact to transportation infrastructure or traffic conditions.

q. Utility Service Systems

The cap-and-trade program, including the proposed compliance offset protocols and associated offset projects would not significantly increase or decrease the need for

utilities and associated services, and as such would be a less than significant impact. The covered entity compliance responses consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes. These projects would not increase the level of utilities beyond that already provided to existing facilities. Fuel switching could require provision of new services. The availability and extension of utilities is subject to approval of the local utility provider, and thus mitigated to less than significant. The ODS Offset Protocol, the Livestock Offset Protocol, and the urban forest protocol and associated projects would not result in a need for an increased level of utilities beyond that already provided to existing facilities. Construction of new facilities would require the extension of utilities and services. The availability and extension of utilities is subject to approval of the local utility provider, and thus mitigated to less than significant. The Forest Offset Protocol would not alter the extent of forest activities, but would shift some activities to projects that sequester carbon. Because the level of overall forest activities would not change, the consequential need for utility service systems associated with those activities would not change. Thus, this impact is considered less than significant.

Because utility districts and other providers of utilities and related services approve the provision of utilities and services before new uses are implemented, impacts to utilities and services are not recognized as actions that aggregate to create cumulative conditions. As such, the proposed cap-and-trade will not contribute to an adverse cumulative impact to utilities and services.

C. Growth-Inducing Impacts

The cap-and-trade program, in combination with the implementation of the Scoping Plan measures will ultimately make California a better place to live. It could encourage growth via green jobs and innovative green technologies. California is renowned for its environmentally progressive laws and regulations, and cap-and-trade would contribute to California's effort to improve public health, contribute towards healthy lifestyles and improved quality of life. These benefits would be fully realized as California moves forward towards the 2020 GHG target, and the all AB 32 measures are implemented.

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6.0 ALTERNATIVES ANALYSIS

CEQA Guidelines section 15126.6(a) requires evaluation of "a range of reasonable alternatives to the project, or the location of the project, which would feasibly attain most of the basic project objectives but would avoid or substantially lessen any of the significant effects, and evaluate the comparative merits of the alternatives." The purpose of the alternatives analysis is to determine whether or not a variation of the proposed project would reduce or eliminate significant project impacts, within the framework of the basic project objectives. Alternatives considered in an environmental document should be potentially feasible and should attain basic project objectives. The basic project objectives of the proposed cap-and-trade regulation are discussed in Part II.A, above. As discussed therein, the basic project objectives are derived from AB 32 and include at least the following:

1. ***Achieve technologically feasible and cost-effective aggregate reductions*** – to achieve the maximum technologically feasible and cost-effective reductions in GHG emissions in the aggregate from sources or categories of sources under the cap, in furtherance of achieving the statewide GHG emissions limit (Health & Saf. Code, § 38562, subd. (a) and (c);

2. ***Distribute allowances equitably*** -- to design, to the extent feasible, the distribution of emissions allowances in a manner that is equitable and seeks to minimize costs and maximize the total benefits to California, and encourages early action to reduce GHG emissions (Health & Saf. Code, § 38562, subd. (b)(1));

3. ***Avoid disproportionate impacts*** -- to ensure, to the extent feasible, that activities undertaken to comply with the regulations do not disproportionately impact low-income communities (Health & Saf. Code, § 38562, subd. (b)(2));

4. ***Credit early action*** -- to ensure, to the extent feasible, that entities that have voluntarily reduced their GHG emissions prior to the implementation of this regulation receive appropriate credit for early voluntary actions (Health & Saf. Code, § 38562, subd. (b)(3));

5. ***Complement existing air standards*** -- to ensure, to the extent feasible, that activities undertaken pursuant to the regulations complement, and do not interfere with, efforts to achieve and maintain national and California AAQS and to reduce TAC emissions (Health & Saf. Code, § 38562, subd. (b)(4));

6. ***Be cost-effective*** – to consider the cost-effectiveness of these regulations (Health & Saf. Code, § 38562, subd. (b)(5));

7. ***Consider a broad range of public benefits*** -- to consider overall societal benefits, including reductions in other air pollutants, diversification of energy sources, and other benefits to the economy, environment, and public health (Health & Saf. Code, § 38562, subd. (b)(6));

8. ***Minimize administrative burden*** – to minimize, to the extent feasible, the administrative burden of implementing and complying with the regulation (Health & Saf. Code, § 38562, subd. (b)(7));

9. ***Minimize leakage*** -- to minimize, to the extent feasible, leakage of emissions to states and countries without a mandatory GHG emission cap (Health & Saf. Code, § 38562, subd. (b)(8));

10. ***Weigh relative emissions*** -- to consider, to the extent feasible, the contribution of each source or category of sources to statewide emissions of GHGs (Health & Saf. Code, § 38562, subd. (b)(9));

11. ***Achieve real emission reductions*** – to ensure that GHG emission reductions achieved through a market- based compliance mechanism are real, permanent, quantifiable, verifiable and enforceable by the state board (Health & Saf. Code, § 38562, subd. (d)(1));

12. ***Achieve reductions over existing regulation*** – to ensure that the reductions from a market-based compliance mechanism are in addition to any GHG emissions reduction otherwise required by law or regulation, and any other GHG emissions reduction that would otherwise occur (Health & Saf. Code, § 38562, subd. (d)(2));

13. ***Complement direct measures*** – to ensure, if applicable, that the GHG emissions reduction from a market-based compliance mechanism occurs over the same time period and is equivalent in amount to any direct emissions reduction required pursuant to AB 32 (Health & Saf. Code, § 38562, subd. (d)(3));

14. ***Consider emissions impacts*** -- to consider, to the extent feasible, the potential for direct, indirect, and cumulative emissions impacts from a market-based compliance mechanism, including localized impacts in communities that are already adversely impacted by air pollution (Health & Saf. Code, § 38570, subd. (b)(1));

15. ***Prevent increases in other emissions*** -- to design, to the extent feasible, any market-based compliance mechanism to prevent any increase in the emissions of criteria air pollutants or toxic air contaminants (TACs) (Health & Saf. Code, § 38570, subd. (b)(2));

16. ***Maximize co-benefits*** -- to maximize, to the extent feasible, additional environmental and economic benefits for California, as appropriate (Health & Saf. Code, § 38570, subd. (b)(3)); and

17. ***Avoid duplication*** – to ensure that electricity and natural gas providers are not required to meet duplicative or inconsistent regulatory requirements (Health & Saf. Code, §§ 38501(g), 38561(a)).

The following additional project objectives are included in the Scoping Plan:

18. ***Establish declining cap*** – to establish a declining cap covering 85% of the state's GHG emissions in furtherance of California's mandate to reduce GHG emissions to 1990 levels by 2020;

19. ***Reduce fossil fuel use*** – to reduce California's reliance on fossil fuels and diversify energy sources while maintaining electric system reliability;

20. ***Link with partners*** – to link with other WCI partner programs to create a regional market system;

21. ***Design enforceable, amendable program*** – to design a program that is enforceable and that is capable of being monitored and verified; and

22. ***Ensure emissions reductions*** – to ensure that emissions reductions are real, permanent, quantifiable, verifiable and enforceable.

A range of alternatives analyzed in an environmental document is governed by the "rule of reason," requiring evaluation of only those alternatives "necessary to permit a reasoned choice" (Guidelines section 15126.6[f]). Further, an agency "need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative (Guidelines section 15126.6[f][3]). The analysis should focus on alternatives that are feasible and that take economic, environmental, social, and technological factors into account, and should focus on reducing or avoiding significant environmental impacts associated with the proposed project. Alternatives that are unreasonable, infeasible, remote, or speculative are not discussed in this FED.

ARB determined the range of alternatives to be considered based on input from the public and advisory committees during the course of a lengthy public process in the development of its Scoping Plan (approved in 2008) and its specific rulemaking for the cap-and-trade program. Among other things, ARB has engaged the public through a "scoping workshop" on August 23, 2010 specifically soliciting input on subject matter to be covered in the FED and more than 30 technical working group meetings and public meetings where invited speakers and members of the public submitted verbal and written comments on components of the regulation. The list of meetings can be found at http://www.arb.ca.gov/cc/capandtrade/meetings/meetings.htm#archive. The thousands of written comments received by ARB on its Scoping Plan, proposed draft cap-and-trade regulation and FED are all archived and available on ARB's web site (www.arb.gov).

In addition to input from the public, ARB has received and relied upon input on cap-and-trade design options and/or alternatives to cap-and-trade from at least four separate, specially formed committees. The Environmental Justice Advisory Committee and the Economic and Technology Advancement Advisory Committee, both formed by ARB pursuant to Health and Safety Code section 38591, have provided both verbal and

written recommendations and comment to ARB. Further, ARB received input from the Market Advisory Committee, formed in 2006 by Executive Order S-20-06, and the Economic and Allocation Advisory Committee. Both of these Committees included leading experts from academia, government, non-governmental organizations and private industry, and published reports which have been made available on ARB's web site.

ARB staff and board members have also met with representatives of national and sub-national governments that are currently operating cap-and-trade programs or alternatives thereto. For example, ARB staff and/or board members have met with representatives of the U.S. EPA (which runs the Acid Rain and NO_x emissions trading programs, as well as many non-cap-and-trade programs), the SCAQMD (which runs the RECLAIM emissions trading program), the Environmental Ministry of British Columbia (which has a carbon fee/tax for GHG emissions from transportation fuels and is developing a cap-and-trade program for industrial and power sector GHG emissions), the British Government, and the European Commission (which oversees the European Union's Emissions Trading Program (EU ETS).

Further, ARB staff has collected and reviewed an extensive library of literature on market-based regulations, including cap-and-trade. Documents incorporated by reference are listed in Section 1.E. The Initial Statement of Reasons (ISOR) for the proposed cap-and-trade regulation (of which this FED is a part) provides additional information and references. Other documents are cited within the text of the FED and listed in Section 10, References.

Based on the input it has received, ARB has examined a wide range of alternatives to the proposed project in this FED. The project alternatives are summarized below and described individually in greater detail later in this section.

a. Do Not Implement the Cap-and-Trade Program ("No Project" Alternative)

CEQA requires a specific alternative of "No Project" to be evaluated. In this case, the No Project Alternative would mean no cap-and-trade regulation, but other measures from the Scoping Plan would continue to be implemented. Under this alternative, California would not meet the 2020 AB 32 goal.

b. Alternatives to Specific Cap-and-Trade Program Design Features

The cap-and-trade regulation could be designed differently than the proposed regulation, which provides opportunities to define alternatives for the FED analysis.

Border Adjustments

Border adjustments are a way to place a price, in the form of allowances or dollars, on the GHG emissions associated with imports, and are meant to create a level playing field when regulations vary across jurisdictions. ARB is proposing to utilize a "first jurisdictional deliverer" approach in the electricity sector – a form of border adjustment – because sufficient information is available on the generation and distribution of electricity imported to California. For non-electricity goods, the program would address

leakage through output based free allocation in which facilities received free allocation of allowances based on their output and industry benchmarks. The proposed regulation could instead be designed to include border adjustments for all products and fuels that are imported into the state.

100 Percent Auction of Allowances

The proposed regulation currently proposes that some allowances would be freely allocated or some allowances would be sold at auction. To allow a smooth transition, staff proposes to freely distribute a substantial number of allowances in the early years of the program. Auction proceeds would be deposited into the Air Pollution Control Fund. As a design option, the regulation could be designed with up to 100 percent auctioning of allowances.

Different Offset Limit

The proposed regulation allows the use of offset credits for up to eight percent of a covered entity's compliance obligation. The range of possible options regarding the use of offsets within the regulation is wide; they may be disallowed, or conversely, be unlimited. Offset project locations may be restricted to California, or have no geographic limits placed on them. Offsets could also be limited to the proposed offset protocols which include the Forest, Urban Forest, Livestock, and Ozone Depleting Substances Project Protocols, or expanded to include additional protocols.

Not Linking to Other Cap-and-Trade Programs

The proposed regulation is designed to allow linkage with WCI jurisdictions' cap-and-trade programs. The regulation could be designed to be a California-only program, or it could be designed so that there is linkage with programs other than those in WCI jurisdictions. No linkages are proposed as part of this action.

Other Program Design Options

Additional design options include facility-specific caps, restricting trading in impacted locations, and disallowing banking of allowances.

c. Implement Only Additional Source-Specific Command-and-Control Regulations Alternative

Instead of pursuing a cap-and-trade regulation, ARB could pursue source-specific emissions limits by regulation to make up the emissions reductions that the Scoping Plan identifies as coming from cap-and-trade. This would involve a regulatory "command-and-control" approach, rather than a carbon-trading, economic-incentive approach. Command-and-control regulations can take several forms, including (a) compelling the use of a specific pollution abatement technology, or (b) setting a source-specific emissions limitation.

d. Carbon Fee Alternative

Under this alternative, Scoping Plan measures other than cap-and-trade would continue, but ARB would also pursue a carbon fee for the sectors covered by the proposed cap-and-trade regulation. In other words, this alternative would replace the cap-and-trade regulation with a carbon fee. A carbon fee, like a cap-and-trade

regulation, is a way to price carbon. However, while cap-and-trade sets a declining cap on emissions through the limit on the number of allowances, a carbon fee does not, allowing sources to emit up to any amount on which they would be willing to pay fees.

e. Cap-and-Trade Linked with a Federal Cap-and-Trade Program Alternative

Federal climate change legislation has been tabled for this congressional session (two calendar years, 2009 and 2010). ARB is moving forward with its development of the cap-and-trade program; however, if a federal cap-and-trade program is established, it is uncertain how existing state and regional cap-and-trade programs would interact with a federal program. ARB would remain involved with providing input on legislative language, policy, and other key components of a federal program. In response to the lack of federal climate change legislation, the U.S. Environmental Protection Agency (U.S. EPA) is developing regulations that would control GHG emissions from mobile and stationary sources.

Because Federal legislation has been tabled, it is speculative to predict the structure and content of a Federal cap-and-trade program. It is uncertain whether or how it would affect California programs. Therefore, its implications for environmental impacts are also too speculative for meaningful analysis. This alternative will not be discussed further.

Consideration of Environmental Performance Standards

One design feature that ARB explored preliminarily was to require "environmental performance standards" for offset projects under each of the protocols. Environmental performance standards are additional requirements contained in the protocols that would apply to all offset projects to ensure that, no matter where the project is located or what laws might apply, certain minimal environmental protections would be guaranteed. Environmental performance standards might include, for example, definitions of the standards, monitoring procedures, and adaptive environmental management for refining the standards and approaches for their achievement over time.

Several issues make inclusion of environmental performance standards in offset protocols infeasible as a design alternative at this time. First, in California, there is no demonstrated need for the additional performance standards given existing environmental laws, including CEQA. Second, outside of California, applying requirements and restrictions that are different from and perhaps in conflict with local laws and the laws of other states could complicate environmental protection, rather than facilitate it. Third, it would be infeasible to create sufficiently detailed performance standards that, if they are to work, must be specific to a large number of project types and a wide range of project locations and environmental conditions. Lastly, requiring additional performance standards for offset projects would add administrative costs, affect the efficiency of the offset market, and, in this way, conflict with AB 32's other objectives. For these reasons, staff has decided not to analyze further variations of alternatives that would include environmental performance standards in the offset protocols.

A. No Project Alternative (No. 1)

1. Description of the No Project Alternative

CEQA requires a specific alternative of "No Project" to be evaluated. The No Project Alternative can help define a future scenario that serves as a point of comparison for cumulative impact contributions of a project. CEQA documents typically assume that the adoption of a "no project" alternative would result in no further action by the project proponent or lead agency. In this case, the No Project Alternative would mean no cap-and-trade regulation, but other ongoing, approved, or foreseeable measures from the Scoping Plan, as well as the SIP under the Clean Air Act, would continue to be implemented.

Under the No Project Alternative, ARB would still achieve significant GHG reductions through the implementation of ongoing, adopted, and reasonably foreseeable measures, but ARB would fall short of its objective to reduce GHG emissions to 1990 levels by at least 18 $MMTCO_2e$ in 2020. This shortfall could be greater if adopted measures fail to achieve expected reductions, if energy efficiency programs are not funded at adequate levels or are less effective than projected, or if the economy grows faster than expected. Making up the shortfall would require development of other action measures; however, the nature of those actions and whether other actions could feasibly make up the shortfall cannot be known at this time. If other actions were developed and pursued, ARB would need to conduct additional CEQA review for them.

Some of the measures from the Scoping Plan that would reduce GHG emissions are already underway, adopted, or reasonably foreseeable and would not be expected to change as a result of the cap-and-trade regulation. Some measures are regulatory, while others anticipate GHG reductions that may be realized as a result of changes in business practices, introduction of technological advances and new equipment, changes in consumer behavior resulting from incentive programs and/or policies. More detailed descriptions and the potential environmental impacts of these measures are addressed in the Scoping Plan and its FED. They are not the subject of the currently proposed action, but they provide context for other GHG reduction programs that are underway, adopted, or reasonably foreseeable for purposes of the No Project Alternative. The ongoing, approved, or foreseeable measures are identified below:

<u>Measures In Capped Sectors</u>

Transportation

- T-1 Advanced Clean Cars
- T-2 Low Carbon Fuel Standard
- T-3 Regional Targets (SB 375)
- T-4 Tire Pressure Program
- T-5 Ship Electrification
- T-7 Heavy Duty Aerodynamics
- T-8 Medium/Heavy Hybridization
- T-9 High Speed Rail

Electricity and Natural Gas
- E-1 Energy Efficiency and Conservation
- CR-1 Energy Efficiency and Conservation
- CR-2 Solar Hot Water (AB 1470)
- E-3 Renewable Electricity Standard (20 percent-33 percent)
- E-4 Million Solar Roofs

Industrial Measures
- I-1 Energy Efficiency and Co-Benefits Audits for Large Industrial Sources

Measures In Uncapped Sources/Sectors

- H-1 Motor Vehicle A/C Refrigerant Emissions
- H-2 SF6 Limits on non-utility and non-semiconductor applications
- H-3 Reduce Perfluorocarbons in Semiconductor Manufacturing
- H-4 Limit High GWP use in Consumer Products
- H-6 Refrigerant Tracking/Reporting/Repair Deposit Program
- H-6 SF6 Leak Reduction and Recycling in Electrical Applications
- F-1 Sustainable Forests
- RW-1 Landfill Methane Control Measure

2. Impact Discussion

a. Objectives

The No Project Alternative would involve implementation of other programs intended to reduce California's GHG emissions, but without the cap-and-trade program. Based on the analysis conducted for this regulation, if the cap-and-trade program was abandoned and not replaced with alternative regulations, California would fall short of the mandate of AB 32 to reduce GHG emissions to 1990 levels by 2020 by at least 18 $MMTCO_2e$. Consequently, the No Project Alternative would not meet the most basic objective of the project, nor create an environmentally advantageous outcome.

The outcome is the same when considering each of the project objectives listed above. Pursuing the No Project Alternative risks losing the benefits of cap-and-trade, which include: achieving the reduction needed to meet the 2020 GHG emission goal; providing a source of funds that could be used to assist low-income communities and communities already adversely affected by air pollution; providing credit for early voluntary action to reduce emissions; complementing existing air standards; incentivizing cost-effective reductions by placing a price on the emissions of GHGs; and the economic, environmental and public health benefits from the additional reductions in GHG emissions obtained through the cap-and-trade program.

b. Environmental Impacts

Many of the adverse environmental impacts described in the cumulative impact analysis would occur under the No Project Alternative, such as the resource-related environmental effects associated with the development of renewable energy projects in response to the existing 20 percent RPS and the recently approved 33 percent RES.

As a result, the No Project Alternative would incur a substantial portion of the adverse environmental impacts of the proposed cap-and-trade program without achieving comparable environmental benefits of reduced GHG and co-pollutant emissions. Consequently, the No Project Alternative would not be environmentally superior to the proposed project.

Aesthetic impacts of the proposed cap-and-trade regulation, including compliance responses by covered entities and the development of offset credits, would be less than significant. Therefore, the adoption of the No Project Alternative would not avoid any significant aesthetic effects of the proposed regulation. The effects of other ongoing, approved, or foreseeable measures that are independent of the proposed regulation would continue to occur, such as potential scenic resource and aesthetic impacts of developing utility-scale renewable energy projects, high-speed rail project, or million solar roofs program.

Agriculture and forest resources impacts of the proposed cap-and-trade regulation, including compliance responses by covered entities and the development of offset credits, would be less than significant. Therefore, the adoption of the No Project Alternative would not avoid any significant agricultural or forest conversion-related effects of the proposed regulation. The effects of other ongoing, approved, or foreseeable measures of the proposed regulation would continue to occur, such as potential conversion of important farmland related to developing utility-scale renewable energy projects or the high-speed rail project.

As discussed in Section 4.B.4.c, localized air quality impacts resulting from compliance responses by covered entities and the development of offset credits are highly unlikely and the specific locations and impact of any such emission increases are uncertain. To address the possibility of unanticipated localized air impacts caused by the cap-and-trade program, ARB has incorporated adaptive management into the project; it is committed to monitoring the data on localized air quality impacts and to adjusting the program if warranted. Adaptive management is discussed in greater detail in Section 2.E of this FED. Even with these considerations, ARB has taken a conservative approach by determining the possibility of localized air impacts to be potentially significant. Therefore, the adoption of the No Project Alternative would avoid these potentially significant localized air quality effects of the proposed regulation. The effects of other ongoing, approved, or foreseeable measures that are independent of the proposed regulation would continue to occur, such as construction-related or operational criteria pollutant emissions from the development of utility-scale renewable energy projects, the high-speed rail project, or refinery activity needed to produce low-sulfur fuels. Also, environmental benefits related to statewide reduction in GHG emissions and corresponding reductions in criteria air pollutants and TACs would not be realized with the No Project Alternative.

Biological impacts of the proposed cap-and-trade regulation, including compliance responses by covered entities and the development of offset credits, involve potentially significant effects related to facility construction at existing facilities where natural resources could be present. Therefore, the adoption of the No Project Alternative could

avoid these potentially significant biological effects of the proposed regulation. The effects of other ongoing, approved, or foreseeable measures that are independent of the proposed regulation would continue to occur. Measures independent of the proposed regulation such as LCFS and RES will require the siting and construction of facilities and as such would be more substantial than the potential effects of the proposed regulation, such as habitat and special-status species effects from the development of utility-scale renewable energy projects or the high-speed rail project.

Cultural resources impacts of the proposed cap-and-trade regulation, including compliance responses by covered entities and the development of offset credits, could involve potentially significant effects related to facility construction at existing facilities where archaeological or historic resources could be present. Therefore, the adoption of the No Project Alternative would avoid these potentially significant cultural resources effects of the proposed regulation. The effects of other ongoing, approved, or foreseeable measures that are independent of the proposed regulation would continue to occur, however, and would be more substantial than the potential effects of the proposed regulation, such as the potential to disturb cultural resources from construction related to the development of utility-scale renewable energy projects or the high-speed rail project.

Energy impacts of the proposed cap-and-trade regulation, including compliance responses by covered entities and the development of offset credits, would be less than significant. In addition, considering the energy efficiency improvements expected as a result of cap-and-trade regulation compliance responses, beneficial reduction of energy consumption would occur with the proposed regulation. Therefore, the adoption of the No Project Alternative would not avoid any significant energy effects of the proposed regulation and certain beneficial energy efficiency effects would not occur. The beneficial energy effects of other ongoing, approved, or foreseeable measures that are independent of the proposed regulation would continue to occur, such as utility-scale renewable energy projects and high-speed rail project.

Geological, soils, and mineral resources impacts of the proposed cap-and-trade regulation, including compliance responses by covered entities and the development of offset credits, could involve potentially significant effects related to facility construction at existing facilities where substantial earthwork would be required. Therefore, the adoption of the No Project Alternative would avoid these potentially significant effects of the proposed regulation to geology, soils, or mineral resources. The effects of other ongoing, approved, or foreseeable measures that are independent of the proposed regulation would continue to occur, however, and would be more substantial than the potential effects of the proposed regulation, such as the potential for substantial grading and erosion from construction related to the development of utility-scale renewable energy projects or the high-speed rail project.

GHG impacts of the proposed cap-and-trade regulation, including compliance responses by covered entities and the development of offset credits, would be beneficial. Therefore, the adoption of the No Project Alternative would not avoid any

significant GHG effects of the proposed regulation and would cause beneficial GHG reduction effects to not be realized.

Hazards and hazardous materials impacts of the proposed cap-and-trade regulation, including compliance responses by covered entities and the development of offset credits, would be less than significant. Therefore, the adoption of the No Project Alternative would not avoid any potentially significant hazardous materials effects of the proposed regulation. The effects of other ongoing, approved, or foreseeable measures that are independent of the proposed regulation would continue to occur, however, and would be more substantial than the potential effects of the proposed regulation, such as the potential for accidental hazardous materials releases from construction related to the development of utility-scale renewable energy projects or the high-speed rail project.

Hydrology and water quality impacts of the proposed cap-and-trade regulation, including compliance responses by covered entities and the development of offset credits, could involve potentially significant effects related to facility construction at existing facilities where water resources are present. Therefore, the adoption of the No Project Alternative would avoid these potentially significant effects of the proposed regulation to hydrology and water quality. The effects of other ongoing, approved, or foreseeable measures that are independent of the proposed regulation would continue to occur, however, and would be more substantial than the potential effects of the proposed regulation, such as the potential for substantial drainage, flood hazard, and water quality effects from the development of utility-scale renewable energy projects or the high-speed rail project.

Land use and planning impacts of the proposed cap-and-trade regulation, including compliance responses by covered entities and the development of offset credits, could involve potentially significant effects related to avoided conversion projects under the Forest Protocol, where actions to protect a forest may conflict with locally adopted development plans. Therefore, the adoption of the No Project Alternative would avoid these potentially significant effects of the proposed regulation to land use and planning. The effects of other ongoing, approved, or foreseeable measures that are independent of the proposed regulation would continue to occur, however, such as the potential for substantial land use and planning conflicts related to the development of utility-scale renewable energy projects or the high-speed rail project.

Noise impacts of the proposed cap-and-trade regulation, including compliance responses by covered entities and the development of offset credits, could involve potentially significant effects related to construction and operational activities occurring as a result of offset projects installing livestock digesters. Therefore, the adoption of the No Project Alternative would avoid these potentially significant effects of the proposed regulation to noise conditions. The effects of other ongoing, approved, or foreseeable measures that are independent of the proposed regulation would continue to occur, however, such as the potential for substantial noise generation related to the development of utility-scale renewable energy projects or the high-speed rail project.

Employment, population, and housing impacts of the proposed cap-and-trade regulation, including compliance responses by covered entities and the development of offset credits, would be less than significant. In addition, considering the potential for facility improvements expected as a result of cap-and-trade regulation compliance responses, beneficial job generation would occur with the proposed regulation (although not substantial enough in number to significantly affect local population or housing demands). Therefore, the adoption of the No Project Alternative would not avoid any significant employment, population, or housing effects of the proposed regulation and certain beneficial job formation effects would not occur.

Public service impacts of the proposed cap-and-trade regulation, including compliance responses by covered entities and the development of offset credits, would be less than significant. Therefore, the adoption of the No Project Alternative would not avoid any significant public services effects of the proposed regulation. The effects of other ongoing, approved, or foreseeable measures that are independent of the proposed regulation would continue to occur, such as potential public service demands resulting from development of utility-scale renewable energy projects or the high-speed rail project.

Recreation impacts of the proposed cap-and-trade regulation, including compliance responses by covered entities and the development of offset credits, would be less than significant. Therefore, the adoption of the No Project Alternative would not avoid any significant recreation effects of the proposed regulation. The effects of other ongoing, approved, or foreseeable measures that are independent of the proposed regulation would continue to occur, however, and would be more substantial than the proposed regulation, such as potential conflict with recreation resource lands from developing utility-scale renewable energy projects on public lands.

Transportation and traffic impacts of the proposed cap-and-trade regulation, including compliance responses by covered entities and the development of offset credits, could involve potentially significant effects related to construction activities. Therefore, the adoption of the No Project Alternative would avoid these potentially significant effects of the proposed regulation to traffic conditions. The effects of other ongoing, approved, or foreseeable measures that are independent of the proposed regulation would continue to occur, however, such as the potential for substantial traffic generation during the construction phase of utility-scale renewable energy projects or the construction and operation of the high-speed rail project.

Utility and service system impacts of the proposed cap-and-trade regulation, including compliance responses by covered entities and the development of offset credits, would be less than significant. Therefore, the adoption of the No Project Alternative would not avoid any significant utility and service system effects of the proposed regulation. The effects of other ongoing, approved, or foreseeable measures that are independent of the proposed regulation would continue to occur, such as potential utility or service system demands resulting from development of utility-scale renewable energy projects or the high-speed rail project.

B. Alternatives to Specific Cap-and-Trade Program Design Features Alternative

The cap-and-trade regulation could be designed differently than the proposed regulation, which provides opportunities to define alternatives for the FED analysis. Design options for the reporting requirements, allowances, offsets, trading and linkage components follow:

1. Border Adjustments (No. 2)

a. Description of the Border Adjustment Design Option Alternative

The purpose of a border adjustment is to avoid tilting the playing field in favor of either imported or domestic production. A border adjustment commonly takes the form of a fee placed on imported goods. It can also take the form of a compliance obligation placed on the deliverer of the imported good into California, i.e., a requirement that the importer surrender allowances equal to the GHG emissions from the product's lifecycle, including production, distribution, and consumption. The primary purpose of a border adjustment is to address leakage, particularly in emission intensive and trade exposed industries. (Economic and Allocation Advisory Committee [EAAC] Report, p. 13.) The EAAC described leakage as follows in its report to ARB:

> Introducing an environmental regulation in one jurisdiction can cause production costs and prices in that jurisdiction to increase relative to costs in jurisdictions that do not introduce comparable regulations. This can precipitate a shift in demand away from goods produced in the implementing jurisdiction toward goods produced elsewhere. As a result, the reduction in production and emissions in the implementing jurisdiction is offset by increased production and emissions elsewhere. The offsetting increase in emissions is called *emissions leakage*.

Other methods of addressing leakage include the free allocation of allowances to in-California sources for some portion of their compliance obligation. As described by EAAC, free allocation "has the potential to mitigate emissions leakage by helping keep prices low for firms within the implementing jurisdiction and thereby helping those firms maintain a share of the larger market." (*Id.*)

The proposed regulation imposes a compliance obligation on electricity generators and industrial sources with emissions greater than 25,000 $MTCO_2e$ starting in 2012. Starting in 2015, the program expands to include fuel distributors to cover emissions of gasoline, diesel, natural gas and propane from sources with emissions below 25,0000 $MTCO_2e$ including all commercial, residential, and small industrial sources. It also phases in fuels used for transportation in 2015. The obligation on electricity generators is placed on the "first deliverer" of the power in California, whether the power is generated within or outside of California. In addition, natural gas, propane, and transportation fuels consumed in California are treated the same by the cap-and-trade

regulation regardless of whether they were produced in California or imported to California.

The obligation on industrial sources applies only to those sources located in California. Rather than using a border adjustment for industrial sources, the proposed regulation provides for free allocation of allowances to industrial sources based on updating output-based free allocation methodology combined with an emissions efficiency benchmark. This method of allocation levels the playing field with out-of-state manufacturers. Alternative #2 considers the use of a border adjustment for the industrial sector.

b. Impact Discussion

As discussed above, a border adjustment and free allocation are designed to achieve the same purpose – to reduce leakage. The effects on the project objectives and differences in environmental impacts of substituting one for the other would therefore not be significant. Applying the border adjustment to non-electricity imports poses substantial technical and legal challenges. The "first deliverer" approach is effective if detailed production data are available on both the imported goods themselves and the entities producing them. Because goods are often traded several times before entering the California market, determining the associated GHG emissions could be exceedingly difficult. The application of border adjustments to interstate and international trade would also face legal scrutiny under the Commerce Clause[9] and World Trade Organization (WTO) principles. WTO principles require the cap-and-trade program to have the capacity to assign or verify emissions associated with the goods produced in California and in foreign counties in exactly the same manner. Because there is still significant uncertainty associated with border adjustments, the program proposes to use output-based free allocation to address emission leakage.

Objectives

Many of the objectives of the program are not substantially affected by the choice between the use of a border adjustment versus free allocation to address leakage. Neither method interferes with the achievement of technologically feasible and cost-effective reductions. The added burden of tracking imports and enforcing compliance obligations on imported industrial goods, however, would likely raise the administrative burden of implementing and complying with this regulation.

Environmental impacts

If leakage occurs, the reductions in GHGs achieved by sources in California may be undone by a corresponding increase in emissions outside of California. While the exporting of California's emissions might reduce the environmental impacts in California and bring a reduction in co-pollutants (by reducing in-state production), it would not achieve a net reduction in emissions of GHGs, would likely lead to increased adverse environmental impacts outside of California, and would have negative effects on California's economy.

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[9] Article I, Section 8, Clause 3 of the United States Constitution

The environmental impacts of using one method versus the other to reduce leakage are not expected to differ substantially. It is very difficult to measure the emissions associated with industrial imports to California given the wide range of products, places from which those products originate, processes used to make those products and carbon intensity of the inputs to make those products. In many cases, ARB would not have a reliable means of checking self-reported emissions.

Another issue ARB considered is whether using free allocation to address leakage would affect the incentives to reduce emissions. As the EAAC report discussed:

> "[o]ne claimed drawback of free allocation is that it reduces firms' incentives to reduce emissions. However, except in cases where firms can influence their receipt of allowances in the future by producing or emitting more in an earlier year …, the number of allowances a firm receives does not reduce incentives to abate emissions or to invest in new, low-emissions technologies. Firms minimize their costs by reducing emissions up to the level where the incremental cost of further emissions abatement just equals the allowance price. This level is largely unaffected by the number of allowances the firm receives for free." (EAAC Report, at p. 14.)

ARB agrees with EAAC's analysis.

2. 100 Percent Auction of Allowances (No. 3)

a. Description of the 100 Percent Auction Design Option Alternative

The proposed regulation contains a mix of free allocation and auction of allowances as described below. This alternative would involve full auction of allowances with no free allocations.

In the proposed regulation, industrial sources would receive free allocations based on an updating output-based free allocation methodology combined with an emissions efficiency benchmark for the purposes of transition assistance and minimizing leakage (see discussion in 1. above). The allocation approach relies heavily on free allocation in the early years of the program transitioning to less free allocation in later years depending on results of the leakage analysis. In addition, electrical distribution utilities including Investor Owner Utilities (IOUs) and Publicly Owned Utilities (POUs) would be allocated allowances for free on behalf of ratepayers.

Requirements for how the freely allocated allowance value can be used differ for IOUs and POUs. For IOUs, the allowances directly allocated to them must be auctioned at general quarterly auctions and the proceeds from these auctions must be used by the electrical distribution utility to mitigate the bill impacts of AB 32 programs on their distribution customers. Most POU's own and operate their own generation and do not compete with independent generators in the way IOU's do. Because of this, allowances directly allocated to POUs may either be consigned for sale at the general quarterly auctions or used directly for meeting their compliance obligations.

Staff is continuing to evaluate possible methods for allocating allowances among the electrical distribution utilities. The allocation must further the cap-and-trade emission reduction objectives, including providing incentives to reduce emissions cost effectively. Additionally, the allocation must enable all the utilities to serve their customers reliably and affordably.

The allowances that are not allocated to industrial sources or electrical distribution utilities would be auctioned by ARB. The remaining auction proceeds would be deposited into the Air Pollution Control Fund and are then subject to appropriation by the Legislature. The auctions would be open to covered entities and other persons who wish to participate. Collectively, the auction of allowances by ARB and electrical distribution utilities would cover a substantial portion of the allowances issued from 2012 through 2014, and that portion would increase for the allowances issued from 2015 to 2020.

In developing the cap-and-trade program, staff determined that a smooth transition into the program under the current economic conditions dictates greater reliance on free allocation of allowances in the early years of the program. Staff views this free allocation as critical to avoid adding an immediate cost to covered industries that could inhibit their ability to invest in emissions reductions. As the program progresses, staff propose a transition to a heavier reliance on auction for allowance distribution while still minimizing leakage where risk exists.

As an alternative, the regulation could be designed with up to 100 percent of the allowances being distributed through an auction with the proceeds being deposited by ARB in the Air Pollution Control Fund for appropriation by the Legislature. In both cases, the use of the fund could be applied to investments for environmental improvements, rate relief for low-income consumers, return to consumers through some form of financial transfer (such as income tax reduction), or other purposes as deemed appropriate by the Legislature. The EAAC has made recommendations on the use of auction proceeds in its report (EAAC Report at pp. 65 – 70).

b. Impact Discussion

Allocating allowances only by auction by ARB would increase the amount of money collected by ARB for the Air Pollution Control Fund and subject to appropriation by the Legislature. Auction proceeds could be appropriated by the Legislature to support other programs or actions that are consistent with the goals of AB 32.

Objectives

Overall, this alternative has a mixed effect on the objectives of the cap-and-trade program, making some objectives easier to achieve and others more difficult, as discussed below.

The EAAC report found that the incentive for technologically feasible and cost-effective reductions can come through use of an auction or well designed free allocation. (EAAC Report, at p.14.) As one example, U.S. EPA's Acid Rain trading program, which has been widely viewed as successful, relies predominantly on the free allocation of

allowances. Other programs that rely exclusively on auctioning, such as the Regional Greenhouse Gas Initiative or RGGI, are too new to judge their impact on emissions reductions. The stringency of the cap, rather than the method of allocation, is likely to be the driver of technologically feasible and cost effective reductions.

Either free allocation or auctioning can be implemented in an equitable manner; no inherent advantage exists for certain sectors over others. Free allocation would reduce covered entities' costs, but auction creates the opportunity to improve environmental benefits depending on decisions on the use of the proceeds. Auctions are inherently equitable for new participants, because all entities have equal access at the auction. As noted above, the proposed regulation provides for the auction of a substantial portion of the allowances.

Disproportionate economic impacts can affect lower income households to the extent that electricity and other energy costs rise in response to the allowance price of the GHG reduction strategy. On a percentage basis, energy costs constitute a greater percentage of lower income household finances than higher income households. Allocation decisions impact the costs borne by households. In a free allocation case, the impacts can be resolved by regulatory control over electricity costs and compensatory programs for low income ratepayers. The auction proceeds of a full auction alternative would provide more than sufficient monies to address any potential for disproportionate economic impact, if the legislature allocated auction proceeds for that purpose.

Substantial differences also do not exist in the degree to which free allocations versus auctions support most of the remainder of the objectives. The ability to credit early actions and complement air quality standards is inherent to an auction approach but can also be achieved under free allocation. Cost effectiveness is inherent in the conduct of an auction, because the market dictates the allowance price. Other societal benefits can be supported by the use of proceeds from a full auction alternative, recognizing this would require legislative action. The choice of full auction would not substantially affect administrative burden, relative emissions of different source categories, achieving real emissions reductions and incremental reductions over existing regulations, complementing direct measures, preventing other emissions increases, capturing co-benefits, and avoiding duplication.

Environmental Impacts

In general, the environmental impacts generated by the cap-and-trade program and offset projects would not be different because of an auction versus free-allocation approach to distribution, because the cap establishes the standard for the degree of GHG emissions reduction needed over time. The level of the GHG cap limit and attendant reductions required would be the primary influences determining the extent of compliance responses implemented by covered entities. The cap level and the proportion of credits allowed from offsets would be the primary influences on the need for offset projects. Implementation of covered entities' compliance responses and development of offset projects would be the sources of environmental impacts. Because the compliance responses and offset projects would not differ from the

proposed project, the environmental impacts of the full auction alternative would be the same as the proposed project.

One factor that could lead to an environmental impact difference of this alternative would be decisions about the use of the additional proceeds created by the all-auction approach to allocating allowances. Depositing the proceeds into the air pollution control fund, as offered for this design option, could lead to financial support for actions that create substantial air quality or other environmental benefits if the Legislature so granted ARB the appropriation authority. If the proceeds were used to fund investments in control of other air pollutant emissions, climate adaptation, or other environmental enhancements, this alternative could be environmentally advantageous compared to the proposed project. However, the proceeds may also be allocated to consumers in need of protection from increased energy costs, consistent with EAAC recommendations. Because use of proceeds would be a future decision of the Legislature, the potential for environmental advantages from the use of allowance value would not be certain (EAAC Report, at pp. 65 – 70).

3. Different Offset Limit (No. 4)

a. Description of the Offset Project Design Options Alternative

Offset credits are generated voluntarily by sectors of the economy that are not under the cap, such as forests. Each offset credit represents a ton of avoided emissions or a ton of carbon that has been permanently sequestered. The proposed regulation allows an entity with a compliance obligation to meet up to eight percent of that obligation using offset credits generated pursuant to one of the protocols in this regulation from projects in the United States, except for the improved forest management projects under the Forest Offset Protocol, which are limited to the contiguous U.S.

AB 32, in relevant part, states that:

> "The state board shall adopt methodologies for the quantification of voluntary GHG emission reductions. The state board shall adopt regulations to verify and enforce any voluntary GHG reductions that are authorized by the state board for use to comply with GHG emission limits established by the state board." (Health & Saf. Code, § 38571.)

The statute does not specify what types of offsets the board should allow, nor how many offsets the board may allow for use to meet a compliance obligation.

The range of possible options regarding the use of offsets within the regulation is nearly infinite. Based on the public process described above, ARB has selected the following reasonable range of alternatives to consider concerning offsets: (a) not allowing the use of offsets; (b) not allowing or restricting the use of offsets by entities in areas already adversely impacted by air pollution, (c) allowing unlimited use of offsets; (d) restricting offsets to projects in California; and (e) allowing additional project types beyond those in the regulation. It should also be noted that offsets could be incorporated into other

Alternatives such as the carbon fee alternative or the Regulated Emissions Limits Only Alternative.

b. Impact Discussion

Objectives

Limitations on the use of offsets (such as not allowing the use of offsets, restricting the use of offsets in certain areas, or limiting offsets to projects in California) would generally decrease the cost-effectiveness of the program. ARB's Updated Economic Analysis of California's AB 32 Climate Change Scoping Plan showed a large increase in the price of 2020 allowances if offsets are not allowed into the system.

Allowing more offsets (allowing unlimited use of offsets or allowing additional project types) would generally increase the cost-effectiveness of the program but could also reduce local economic, environmental and public health co-benefits associated with emission reductions from capped sources. Allowing more offsets could also delay California's transition to a low-carbon economy. This transition is critical to meet California's long-term greenhouse gas emissions reductions goals.

Environmental Impacts

The offset design options alternative offers a wide variety of potential design modifications that can either increase or decrease potential environmental impacts. An overview of the environmental implications of the options follows.

If offsets were disallowed entirely, the potentially significant impacts associated with their development would not occur for the four protocols proposed as part of the cap-and-trade program. At the same time, however, the opportunity for attendant environmental benefits of the four offset protocols would be lost. In the absence of offsets, allowances are the sole form of compliance instrument, meaning all covered entities would need to surrender allowances equal to 100 percent of their emissions. Covered entities facing only high marginal costs for GHG emission reduction measures would be expected to purchase and bank allowances, further shortening the supply of allowances. In addition, for the cap to remain the same, all the reductions would need to come from covered entities. Based on the economic analysis of the proposed cap-and-trade regulation, presented in Section VIII of the staff report and Appendix N, it is uncertain whether covered entities could feasibly or cost-effectively achieve the planned GHG reductions in a timely manner without the availability of offset credits.

Not allowing or restricting the use of offset credits by entities in areas already adversely impacted by air pollution is another option that has been suggested for the offsets portion of the cap-and-trade regulation. The effect of a prohibition would be to compel covered facilities in those geographic areas to acquire allowances to cover 100 percent of their emissions, instead of 92 percent under the proposed regulation. A further restriction on the use of offset credits would likely have the effect of raising the portion of allowances to somewhere between 92 and 100 percent. It is likely this would increase the cost of compliance for covered facilities in these areas, making this a less cost-effective approach for GHG reduction. A potential difference in environmental

impacts of this alternative could be related to localized pollutant reductions. On a cumulative scale, the level of overall GHG reduction would not change substantially from the proposed regulation; however, in areas where reductions must be limited to surrender of allowances, covered entities would bear a higher cost to acquire compliance instruments. These increased costs might lead to a greater degree of on-site GHG abatement along with attendant reductions in other pollutants. Otherwise, environmental effects of the design option of restricting the use of offsets for reductions in areas already adversely affected by air pollution would not be substantially different from the proposed regulation.

If the number of offset credits allowed for the four proposed protocols were unlimited, the number of offset projects could increase because of the potential for a price advantage over allowances, assuming a sufficient supply of offset projects. Additional offset credits would likely be developed for the Urban Forest, Forest, and Livestock Offset Protocols. The number of offset credits generated from ODS destruction would not change substantially, because of the finite bank of ODS available. The magnitude of environmental impacts associated with development of offsets under the Urban Forest, Forest, and Livestock Offset Protocols could increase. Recognizing the predicted price advantage of offset credits over allowances, it would be likely that on-site GHG reduction by covered entities would be less with this design option than under the proposed regulation. If on-site GHG reduction by covered entities were lower, the opportunity to reduce co-pollutant emissions that often accompany GHG emissions reduction would not be realized. A potential air quality benefit of the proposed regulation could, therefore, be reduced.

The environmental implications of geographic limits for offset development would relate to the potential locations of environmental impacts and the supply of offset credits. The proposed regulation and program allows for out-of-state offset credits developed for all four offset protocols in the entire U.S., with restriction of improved forest management projects under the Forest Offset Protocol to the contiguous U.S. If the geographic limits were expanded to elsewhere in North America, i.e., Canada, Mexico, or other nations, the capacity to create offset credits could increase considerably and the potential for environmental impacts from the credit development would be more widespread. Also, the opportunity to use offset credits from linked programs could be included in the cap-and-trade program, such as early actions from the Climate Action Reserve (CAR), WCI partners such as Canadian provinces and New Mexico (which are in the process of developing GHG reduction programs), and broader international programs, such as Reduced Emissions from Deforestation and Forest Degradation (REDD). If broader geographic limits for offset projects or other linked programs are considered, the geographic reach of potential environmental impacts would expand to these other jurisdictions. Additional environmental analysis must take place when these linkages are considered.

In addition to the four offset protocols evaluated at this time (i.e., ODS, Urban Forest, Forest, and Livestock Offset Protocols), other protocols have been developed by other organizations and jurisdictions. For instance, the CAR has issued protocols for U.S. and Mexico landfills, Mexico livestock, coal mine CH_4, HNO_3 production, and organic

waste composting and digestion. Expansion of the list of available compliance-grade protocols would create the opportunity for greater GHG reduction through offset credits. Environmental impacts could be expected to occur with other offset protocols.

4. Other Program Design Options (No. 5)

a. Description of the Other Program Design Options

The proposed regulation allows trading with capped sources and linkage to other programs. Additional design options include a facility-specific cap or restricting trading in communities that are already adversely affected by air pollution, and disallowing banking of credits.

b. Impact Discussion

Objectives

A facility-specific cap would be similar to Alternative 7. Under this option, ARB would need to identify the specific facilities that would be covered by the program, conduct an appropriate analysis to support a specific cap for each facility, and consider whether the reduction requirements established the declining cap for the facility would be cost-effective. Such a program would be extremely difficult to apply to imported electricity or to distributed use of fuels so that the overall scope of the program would likely need to be limited to industrial facilities and in-state power plants. Facility-specific caps would diminish the flexibility of the program, increasing both administrative complexity and cost to comply.

Restricting trading in communities in adversely impacted communities is similar to a facility-specific cap, but applied only to discrete locations. Restricting trading increases the cost to comply with the program, reducing cost-effectiveness.

Banking of allowances provides market stability during times when emissions may fluctuate due to weather or economic conditions. In such times, banking helps to present large fluctuations in allowances price, and provides price stability by assuring that allowances will retain their value. Banking also incentivizes early emissions reductions.

Environmental Impacts

Design refinements for the cap and allowances that set specific caps for facilities, limit trading in certain locations, and restrict banking of credits could cause localized variations in environmental impacts, but would not appear to be sufficient to cause changes in overall environmental impact conclusions for the cap-and-trade program.

A facility-specific GHG emission cap in areas already adversely impacted by air pollution would not lower the overall GHG emissions allowed under the cap-and-trade program. The overall GHG emissions allowed are determined by the aggregate goal for the sectors included in the cap-and-trade program. Facility specific caps, however, could act as a limit on the emissions of co-pollutants by any given facility over the three-

year compliance period, which could result in greater co-pollutant reductions in those areas.

Implementation of facility-specific caps, however, would likely impede the cost effectiveness of the cap-and-trade regulation by compelling reductions from specific facilities that may be more expensive than reductions from other facilities. Further, facility-specific caps could cause greater emissions leakage to other communities in California or to other states, if reductions at capped facilities could not be accomplished in a sufficiently cost effective manner.

Limits on trading by facilities in areas already impacted by air pollution can take many forms. One example is a variant on the concept of facility specific caps discussed above, limiting the ability of such facilities to purchase allowances for emissions greater than an predetermined amount. The analysis above would apply equally to such a restriction. Another example that has been discussed in the academic literature is a restriction that subjects trades by facilities in such areas to some sort of screen or regulatory approval. As provided above, restricting the ability of a subset of facilities to trade does not reduce the GHG cap for the program, because the same number of allowances are in circulation, but would increase the complexity, administrative burden, and cost of the program.

If banking of credits were entirely disallowed, covered entities would need to use or sell their allowances and offset credits by the end of a compliance period. This may cause covered entities to act more conservatively in the acquisition of allowances and credits, so as not to lose them if they are not needed. Banking provides market stability during times when emissions may fluctuate due to weather or economic conditions. Banking also helps provide price stability by assuring that allowances will retain their value, and gives covered entities a stake in the continued operation of the program because allowances are a financial asset. In the long run, however, the cap would be the prevailing benchmark for the number of allowances and offset credits created. Therefore, variations in permitting the banking of credits would not result in substantial environmental impact differences.

5. Not Linking to Other Cap-and-Trade Programs (No. 6)

a. Description of Not Linking to Other Cap-and-Trade Programs

The proposed regulation is designed to link with WCI, although no linkages are proposed in this rulemaking. The regulation could be designed to be a California-only program, or it could be designed so that there is “one way” linkage with programs other than WCI.

b. Impact Discussion

Objectives

Linking with external greenhouse gas emission trading systems (ETS) involves jurisdictions accepting one another’s allowances and offsets for compliance, creating a regional market. Linkage would increase the total supply of compliance instruments,

which would reduce compliance costs for California's covered entities. As proposed, the cap-and-trade regulation does not link with any external greenhouse gas ETS. Future linkages would require regulatory action by the Board supported by case-by-case analysis, including an environmental assessment.

While linkage would require California to forfeit some control over where the reductions occur (i.e. out-of-state versus in-state), ARB believes the increased cost-effectiveness of the program that should result from a more liquid and better functioning market for California's covered entities offsets the possibility of fewer in-state reductions.

Environmental Impacts

Variations in the approvals of linkages could influence environmental impacts of allowances and offset credits created under other linked programs. A primary question related to the environmental impacts of linked programs is the degree of environmental review and protection/mitigation requirements in the other jurisdictions where linked programs would be approved. California environmental laws are typically more protective than the laws of other states and nations. If linkage was restricted to California programs only, the state's environmental laws would maintain protections through environmental impact assessment of public agency actions (under CEQA) and other laws protecting natural resources. Restricting linkage to California may have some advantages for environmental protection; however, the capacity to develop emissions credits would be substantially limited. Also, the overall cap-and-trade program includes accepting offset projects from outside California, so a geographic limitation on linkage would not result in a substantial environmental advantage on its own.

A linkage program with comprehensive environmental protection standards adopted as conditions of approval would create the opportunity to gain GHG reduction benefits while avoiding or minimizing the potential for other environmental impacts. Protocols could be established to require achievement of environmental standards, including definition of the standards, monitoring procedures, regular reporting of monitoring results to California, and adaptive environmental management for refining the standards and approaches for their achievement over time.

C. Implement Only Additional Source-Specific Command-and-Control Regulations Alternative (No. 7)

1. Description of the Implement Only Additional Source-Specific Command-and-Control Regulations Alternative

Instead of pursuing a cap-and-trade regulation, ARB could pursue source-specific emissions limits by regulation to make up the emissions reductions that the Scoping Plan identifies as coming from cap-and-trade. This would involve a regulatory "command-and-control" approach, rather than a carbon-trading, economic-incentive approach. Command-and-control regulations can take several forms, including (a) compelling the use of a specific pollution abatement technology, or (b) setting a source-specific emissions limitation. For the purposes of this alternatives analysis, ARB has

assumed that only regulated emissions limits would be implemented. However, command-and-control regulations could be designed to incorporate offsets, which would provide additional flexibility and would alter the potential impacts.

According to the Congressional Budget Office, any incentive-based approach – be it cap-and-trade or a carbon fee – "could achieve a given cut in emissions at a lower cost than command-and-control approaches, in which the government mandated how much individual factories could emit or what technologies they should use" (CBO 2008, p. 1). Similarly, the ETAAC stated in its recommendations to ARB that:

> "establishing a price for carbon and other GHG emissions can effectively tilt decision-making toward cleaner alternatives. This cap-and-trade approach (complemented by technology-forcing performance standards) avoids the danger of having government or other centralized decision-makers choose specific technologies, thereby limiting the flexibility to allow other options to emerge on a level playing field."

In the four years of proceedings conducted by ARB since the start of its development of early action measures through today, the public and various advisory committees have offered numerous ideas for additional command-and-control regulations on sources of GHG emissions. Thus, the suite of command and control regulations that ARB or other state agencies would need to adopt would depend on the information that is learned in the future during the regulatory development processes.

Unlike technology available for many other pollutants, there is no scrubber that can be placed at the top of a smokestack or converter that can be attached to a combustion engine to reduce or permanently capture most GHGs. Carbon capture and storage is developing as a technology, but it has yet to be a cost-effective, widely viable GHG reduction technology for the types of stationary sources that would be subject to the cap-and-trade program (CCCCSRP 2010; IPCC 2005, p. 8). Most of the potential reductions available are based on energy efficiency improvements, switching fuel sources (e.g., from coal to natural gas; from oil to biofuels) or building new renewable generation. That is why many of the measures adopted by ARB pursuant to the Scoping Plan use "performance-based" standards.

If ARB pursued this alternative, it would likely focus primarily on the industrial sector because the transportation, electricity, and natural gas sectors are already extensively addressed[10] through complementary Scoping Plan measures. Command and control measures would not allow for the demand-side response to an allowance price signal across the entire economy. The price signal established through a cap-and-trade program would provide an incentive for investment in energy efficiency and clean fuels

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[10] The transportation, electricity, and natural gas sectors provide over 80 percent of total adopted and foreseeable 2020 reductions from complementary measures, whereas the industrial sector provides less than 1 percent of these reductions.

and would also drive energy efficiency and conservation in consumer and residential energy use beyond that required in the Scoping plan comp measures. Command and control measures would be challenging to draft and implement.

2. Impact Discussion

The command-and-control approach of this alternative would rely on enforcement of sector or source-specific emissions limits, rather than the incentive-based approach of the cap-and-trade program. As a result, several of the AB 32 objectives would not be achieved. The potential source of environmental impacts would likely shift more to equipment or process changes to reduce GHG, if they are feasible, rather than development of offset credits.

a. Objectives

Enforcement of regulated limits could require greater attention and effort toward the development of technological approaches to reduce GHG generation and/or abate emissions on an industry-by-industry basis. While this may lead to identifying technologically feasible reductions, they would likely be more costly than the proposed cap-and-trade program, because market forces would not be influencing the discovery and use of the most cost-effective strategies.

Because command-and-control regulations do not distribute allowances in the marketplace, there would be no market-driven opportunity to explore approaches to equitable distribution of reductions. Regulations would set emissions intensity ceilings and all entities would need to comply, without regard to relative cost of the strategies. This could lead to inequitable allocation of costs and disproportionate impacts. Auction proceeds that could be used to offset disproportionate economic impacts on low income communities or meet their objectives would not exist.

Other potential objectives that may not be met with a command-and-control approach could be minimizing leakage, minimizing administrative burden, and achieving cost-effectiveness. Although it should be noted that command-and control regulations can be designed to minimize or avoid leakage. Setting and enforcing a regulatory emissions limit would require establishing a permitting, approval, and monitoring or reporting program on a facility-by-facility basis, similar to the current organization of regulation of criteria pollutants. Responsibility for implementation would need to be determined, such as whether to delegate to air districts or retain the enforcement authority at ARB. This would create administrative regulatory burdens and costs on both the enforcing agencies and the regulated entities. With the increase in burden and no marketplace solutions to help ease the burden (as would exist with the proposed cap-and-trade program), additional leakage could be encouraged if entities seek to avoid being regulated. Market opportunities to reduce the cost of GHG emissions reductions would not exist, so each regulated entity would need to incur its own reduction expenses, regardless of relative degree of cost.

The remainder of the project's objectives could either be met or would not be applicable in the context of an alternative approach using a regulated and enforced emissions limit.

b. Environmental Impacts

If the state approached GHG reduction by establishing mandated emissions limits that regulated entities must meet, it would focus efforts on on-site modifications of facilities to achieve the reduction limits. The compliance responses by regulated entities and environmental impacts would be similar to those identified for the covered entities in the FED. The number of regulated entities implementing on-site modifications would likely increase, because allowance purchases would not be available. Offset credits could still be permitted as a means to comply with command-and-control regulations.

One difference in environmental impacts of a mandated and regulated emissions limit could be the potential for leakage of emissions to other states. Assuming a national or larger regional regulatory program is not implemented, the added regulatory burden and cost of compliance with a mandated limit, without the opportunity to find the most cost-effective approaches through the market mechanisms of cap-and-trade, could encourage greater leakage. If greater leakage occurred, air pollutant emissions could be exported to other out-of-state locations. Key factors to consider would be the relative costs of operations inside and outside the state resulting from GHG emissions regulations and the interaction of this cost differential with physical system capacities, such as transmission or transport capability. While a higher relative degree of leakage of a mandated and regulated emissions limit is not certain, because global experience with GHG regulation is still in its early stages, the absence of marketplace opportunities for decreasing cost of GHG reductions would indicate that higher leakage is possible.

Mandated emissions limits applied to specific regulated entities and facilities could provide more certainty regarding the location of GHG emissions reductions. Because the limits are fixed and enforceable, they need to be achieved in the locations where they are mandated. This would remove any lingering uncertainty about a potential for emissions to increase locally as a result of the more flexible cap-and-trade approach to GHG reductions. The certainty about avoiding localized increases in emissions could be an environmental advantage of this alternative.

D. Carbon Fee Alternative (No. 8)

1. Description of the Carbon Fee Alternative

Under this alternative, ongoing, adopted, and reasonably foreseeable measures would remain in place, but ARB would pursue a carbon fee for sectors that would be covered by a cap-and-trade regulation. This alternative would replace the cap-and-trade regulation. The primary similarity between a carbon fee and a cap-and-trade regulation is that both put a price on GHG emissions, providing an incentive for businesses and individuals to reduce their emissions, in contrast to a command-and-control approach in which government would mandate how much individual entities could emit or what technologies they should use (CBO 2008, p. 1).

The principal difference between a carbon fee and cap-and-trade program is that a fee places an upper limit on the cost of reducing emissions, but leaves the total amount of GHG emissions in a given time period uncertain, whereas a cap-and-trade program sets

a total limit on emissions during a particular period and allows supply and demand to determine the cost of emissions (CBO 2008, p.1). These two factors are sometimes referred to as "price certainty" and "environmental certainty." As noted by the Congressional Budget Office in its study of alternatives, there are several ways to modify the design of a cap-and-trade program to improve its level of price certainty. Some of those modifications, or variations on them, are included in the proposed cap-and-trade regulation. Below, the similarities and differences between a carbon fee and a cap-and-trade program are discussed in more detail in the context of the program objectives.

ARB is currently in the beginning phases of implementing its AB 32 Cost of Implementation Fee regulation. This Fee regulation is a separate and discrete effort to fund AB 32 program implementation, and is distinct from the carbon fee alternative being discussed here.

2. Impact Discussion

Many of the potential consequences of a carbon fee program would be similar to the proposed cap-and-trade program; however, certain differences exist.

a. Objectives

Both a carbon fee and a cap-and-trade program provide a more cost-effective means to achieve technologically feasible aggregate reductions when compared to command and control regulation. The price signal with either approach provides an incentive for technological innovation. In addition, the efficiency of either method is enhanced by pairing these market-based mechanisms with complementary approaches, such as performance standards, as proposed in the Scoping Plan. The non-market based regulations are particularly useful in areas where a price signal alone would not change behavior. For the purposes of this alternatives analysis, ARB has assumed that only a carbon fee would be implemented. However, a carbon fee could be designed to incorporate offsets, which would provide additional flexibility and would alter the potential impacts.

There is some debate as to the effect of differences in long-term price certainty between a carbon fee and a cap-and-trade program on investment in technological change. The proposed regulation takes several steps to provide price certainty. The proposed regulation includes a price floor for allowances that are auctioned and provides for a reserve of allowances that are available at a known price throughout the life of the program. In addition, the proposed program uses a three-year compliance period to even out the effect of year-to-year variation in the level of emissions due to factors, such as weather, disruptions in energy markets, the level of economic activity, and the availability of new low carbon technologies (CBO 2008, p. ix), and allows a limited number of offsets.

A carbon fee does not distribute allowances, whereas the proposed cap-and-trade program uses an equitable distribution of allowances to address leakage and other issues. A carbon fee would incent early action to reduce emissions. The auctioning of

a portion of the allowances in a cap-and-trade program as ARB proposes, as well as a benchmarking allocation system provide a similar incentive.

A carbon fee would likely lead to costs being passed on to consumers, including low-income consumers. If a portion of the carbon fee proceeds were used to offset the impact on low income consumers, the result of this alternative could be similar to the proposed cap-and-trade program.

The carbon fee alternative would generally achieve most other project objectives without substantial difference from the proposed cap-and-trade program, including complementing existing air standards, considering a broad range of benefits, level of administrative burden, weighing relative emissions, complementing direct measures, considering emissions impacts, preventing increases in other emissions, capturing co-benefits, and avoiding duplication. Because both approaches establish a price for carbon reduction, many of the compliance influences are similar. However, it is more difficult to structure the carbon fee to provide certainty that the greenhouse gas emission reduction goal will be met.

Three potentially important differences in achievement of objectives relate to cost effectiveness, leakage, and emissions reductions. The carbon fee approach may be less cost-effective than the market-responsive, cap-and-trade program, because the price of carbon is set administratively rather than in response to the market. A more fixed, administratively established fee could reduce incentives to innovate cost-effective approaches, compared to the cap-and-trade program's responsiveness to market incentives. If the carbon fee was set with no opportunities to tailor the fee level to market influences, the potential for leakage could be increased. The magnitude of this potential would depend on the relationship between the level of the fee and the market price of carbon reduction. For this analysis, ARB assumed the carbon fee alternative would not include use of offsets. If that were the case a carbon fee approach would only include GHG reduction at covered entity facilities or sequestration by covered entities for avoiding or reducing the fee. This could lead to greater reliance on GHG reductions at the facility sites of covered entities, although this needs to be weighed against the attendant greater potential for leakage outside the state.

b. Environmental Impacts

While with a carbon fee approach the price of carbon is set by the state rather than by the market, if the fee were set with the goal of getting to the 2020 GHG emissions goal for the covered sectors, many of the environmental impacts of the program would be similar to the cap-and-trade regulation. For instance, the types of on-site compliance responses for covered entities would be similar to a cap-and-trade program.

Potential differences in environmental impacts important to note are related to offsets and leakage. The carbon fee program would not include an offset component, so potential impacts of developing offset credits associated with the cap-and-trade program would not occur. Further, the GHG reduction capacity of an offset program would not be available, so its moderating influence on the price of GHG reduction would also be absent. Consequently, the relationship of the fee level to the real cost of GHG reduction

becomes important. If the fee turns out to exceed the real market cost, it could encourage greater leakage than a cap-and-trade program with an export of emissions and potential for impacts in out-of-state locations.

E. Cap-and-Trade Linked with a Federal Cap-and-Trade Program Alternative

Federal climate change legislation has been tabled for this congressional session (two calendar years, 2009 and 2010). ARB is moving forward with its development of the cap-and-trade program; however, if a federal cap-and-trade program is established, it is uncertain how existing state and regional cap-and-trade programs would interact with a federal program. ARB would remain involved with providing input on legislative language, policy, and other key components of a federal program. In response to the lack of federal climate change legislation, the U.S. Environmental Protection Agency (U.S. EPA) is developing regulations that would control GHG emissions from mobile and stationary sources.

Because Federal legislation has been tabled, it is speculative to predict the structure and content of a Federal cap-and-trade program. It is uncertain whether or how it would affect California programs. Therefore, its implications for environmental impacts are also too speculative for meaningful analysis. This alternative will not be discussed further.

F. Comparison of Alternatives

To assist in an understanding of the relative ability of the alternatives to achieve project objectives, a comparison table is provided below. Table 6-1 presents the project objectives and the achievement of them by the alternatives. The alternative of linking to a Federal cap-and-trade program is not included in the tables, because the structure and content of the alternative is not known (recognizing Federal legislation has been tabled).

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Table 6-1
Comparative Likelihood That Alternatives Achieve Project Objectives

KEY
L (low) = No or low likelihood to achieve objective
M (medium) = Medium likelihood of achieving objective
H (high) = High likelihood to achieve objective

	ALTERNATIVES									
OBJECTIVES		Cap-and-Trade	# 1 No Project	# 2 Border Adjust	# 3 All Auction	# 4 Offset Design	# 5 C&T Design	# 6 Link Design	# 7 Emit Limit	# 8 CrbFee
	1. Achieve reductions	H	L	H	H	H	H	H	H	M
	2. Distribute equitably	H	L	H	H	H	H	H	L	H
	3. Avoid disproportionate impacts	H	L	H	M	H	H	H	H	M
	4. Credit early action	H	L	H	H	H	H	H	H	H
	5. Complement existing air standards	H	L	H	H	M	M	M	H	H
	6. Be cost-effective	H	L	H	H	H	H	H	L	L
	7. Consider a broad range of benefits	H	L	H	H	H	H	H	H	H
	8. Minimize administrative burden	H	L	L	H	M	H	M	M	H
	9. Minimize leakage	H	L	H	L	H	M	H	L	L
	10. Weigh relative emissions	H	L	H	H	H	H	H	H	H
	11. Achieve real emissions reductions	H	L	H	H	H	H	H	H	H
	12. Achieve incremental reductions over	H	L	H	H	H	H	H	H	H
	13. Complement direct measures	H	L	H	H	H	H	H	H	H
	14. Consider emissions impacts	H	L	H	H	H	H	H	H	H
	15. Prevent increases in other emissions	H	L	H	H	H	H	H	H	H
	16. Capture co-benefits	H	L	H	H	H	H	H	H	H
	17. Avoid duplication	H	L	H	H	H	H	H	H	H
	18. Establish Declining Cap	H	L	H	H	H	H	H	L	L
	19. Reduce Fossil Fuel Use	H	L	H	H	H	H	H	H	H
	20. Link with Partners	H	L	H	H	H	H	H	L	L
	21. Enforceable, Amendable Program	H	L	H	H	H	H	H	H	H
	22. Ensure Emissions Reductions	H	L	H	H	H	H	H	H	H

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7.0 MANDATORY FINDINGS OF SIGNIFICANCE

Consistent with the requirements of State CEQA Guidelines, Appendix G, Environmental Checklist, Section 18, this FED addresses the mandatory findings of significance for a project.

A. Mandatory Findings of Significance

1. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat for 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?

Under Section 15065(a) of the CEQA Guidelines, a finding of significance is required if a project "has the potential to substantially degrade the quality of the environment." In practice, this is the same standard as a significant effect on the environment, which is defined in Section 15382 of the CEQA Guidelines as "a substantial or potentially substantial adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance." As with all of the environmental effects and issue areas, the precise nature and magnitude of impacts would depend on the types of projects authorized, their locations, their aerial extent, and a variety of site-specific factors that are not known at this time but that would be addressed by environmental reviews at the project-specific level. For projects within California, all of these issues would be addressed through project-specific environmental reviews that would be conducted by local land use agencies (e.g., cities, counties, CPUC) or other regulatory bodies at such time the projects are proposed for implementation. Outside of California, other state and local agencies would consider the proposed projects in accordance with their laws and regulations. ARB would not be the agency responsible for conducting the project-specific environmental or approval reviews because it is not the agency with authority for making land use or project implementation decisions.

This FED, in its entirety, addresses and discloses potential environmental effects associated with implementation of the cap-and-trade program, including direct, indirect, and cumulative impacts in the following resource areas:

- Aesthetics
- Agriculture and Forest Resources
- Air Quality
- Biological Resources
- Cultural Resources
- Energy Demand

- Geology, Soils, and Mineral
- Greenhouse Gases
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Noise
- Employment, Population and Housing
- Public Services
- Recreation
- Transportation and Traffic
- Utilities and Service Systems

As described in Chapter 4, "Impact Analysis", this FED discloses potential environmental impacts, the level of significance prior to mitigation, mitigation measures, and the level of significance after the incorporation of mitigation measures.

a. Impacts on Species

Under Section 15065(a)(1) of the CEQA Guidelines, a lead agency shall find that a project may have a significant effect on the environment where there is substantial evidence that the project has the potential to (1) substantially reduce the habitat of a fish or wildlife species; (2) cause a fish or wildlife population to drop below self-sustaining levels; or (3) substantially reduce the number or restrict the range of an endangered, rare, or threatened species. Chapter 4, "Biological Resources," of this FED addresses impacts related to the reduction of the fish or wildlife habitat, the reduction of fish or wildlife populations, and the reduction or restriction of the range of special-status species. Potential impacts from the proposed regulation were evaluated primarily on the basis of review of pertinent literature, review of relevant reports pertaining to specific resources, and review of available databases documenting species and habitat occurrences.

b. Impacts on Historical Resources

Section 15065(a)(1) of the CEQA Guidelines states that a lead agency shall find that a project may have a significant effect on the environment where there is substantial evidence that the project has the potential to eliminate important examples of a major period of California history or prehistory. Section 15065(a)(1) amplifies Public Resources Code (PRC) Section 21001(c) requiring that major periods of California history are preserved for future generations. It also reflects the provisions of PRC Section 21084.1 requiring a finding of significance for substantial adverse changes to historical resources. Section 15064.5 of the CEQA Guidelines establishes standards for determining the significance of impacts to historical resources and archaeological sites that are a historical resource. Chapter 4, "Cultural Resources," of this FED addresses impacts related to California history and prehistory, historic resources, archaeological resources, and paleontological resources.

In general, the types of historical resources likely to be affected by new development includes prehistoric and historical archaeological sites such as prehistoric habitation sites, lithic tool and debris scatters, bedrock milling stations, quarries, rock art, historical refuse scatters, mining pits, ranching and agricultural artifact scatters or structural ruins, native plant gathering areas, traditional cultural properties, and sacred sites.

The number of potential future compliance responses and offset projects cannot be known and will depend upon myriad economic, political, and environmental factors. The analysis presented in the FED provides a reasonable characterization of the way in which the future could unfold; analysis of additional potential future scenarios would not meaningfully add to the body of evidence necessary for ARB to make an informed decision with regard to the proposed regulation.

In addition, as with all of the environmental effects and issue areas, the precise nature and magnitude of impacts would depend on the types of projects authorized, their locations, their size, and a variety of site-specific factors that are not known at this time but that would be addressed by environmental reviews at the project-specific level.

The cap-and-trade program may have the potential to degrade the quality of the environment relating to fish or wildlife species, inadvertently damage or eliminate important examples of the major periods of California history or prehistory. There are many laws and regulations and best practices currently in place, that when adhered to and location-specific mitigation is implemented, would largely reduce these impacts to a level of insignificance. However, because ARB does not have the authority to require implementation of project-specific mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Therefore, ARB finds the cap-and-trade program to potentially result in adverse impacts to biological and cultural and historical resources.

2. Does the project have impacts that are individually limited, but cumulatively considerable?

As required by Section 15065 of the CEQA Guidelines, a lead agency shall find that a project may have a significant effect on the environment where there is substantial evidence that the project has potential environmental effects that are individually limited, but cumulatively considerable. As defined in Section 15065(a)(3) of the CEQA Guidelines, cumulatively considerable means “that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.” Cumulative impacts are addressed for each of the environmental topics listed above and are provided in Chapter 4, ”Cumulative and Growth Inducting Impacts,” of this FED. The analysis depicts that the cap-and-trade program may present potentially cumulative impacts to the following resource areas:

- Biological
- Cultural
- Geology, Soils, and Minerals
- Hydrology, Water Quality and Water Supply

3. Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?

Consistent with Section 15065(a)(4) of the CEQA Guidelines, a lead agency shall find that a project may have a significant effect on the environment where there is substantial evidence that the project has the potential to cause substantial adverse effects on human beings, either directly or indirectly. Under this standard, a change to the physical environment that might otherwise be minor must be treated as significant if people would be significantly affected. This factor relates to adverse changes to the environment of human beings generally, and not to effects on particular individuals. While changes to the environment that could indirectly affect human beings would be represented by all of the designated CEQA issue areas, those that could directly affect human beings include air quality, geology and soils, hazards and hazardous materials, hydrology and water quality, noise, population and housing, public services, transportation/traffic, and utilities, which are all addressed in Chapter 4, “Impact Analysis” of this FED.

The cap-and-trade program would not cause substantial adverse effects on human beings, either directly or indirectly. The cap-and-trade program is one of the many measures in the Scoping Plan that result in overall improvement of air quality and public health in California.

B. Significant and Unavoidable Environmental Effects

Because the authority to determine project-level impacts and require project-level mitigation lies with the permitting agency for individual projects, and the programmatic analysis in this FED does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, the FED takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the following potentially significant impacts may be unavoidable.

1. Covered Entity Compliance Responses

- Grading, trenching and associated site disturbance for placement of new structures, tanks, and/or utility or fuel lines at existing industrial facilities. Construction activities could result in the following potentially significant impacts:
    - short-term elevated emissions from operation of construction equipment and dust generation (Air Quality),
    - disturbance, displacement, or destruction of sensitive plant or animal species or protected habits (Biological Resources),

- disturbance, alteration, or destruction of historical resources, significant or unique archaeological resources, undocumented human remains, or unique paleontological resources or sites, and,
- increased erosion and consequent sedimentation of local waterways, some of which could be designated as impaired waters of the state (Geology, Soils, and Mineral Resources, Hydrology and Water Quality).

- Although unlikely, some compliance responses could increase operation of equipment at existing facilities that could result in elevated localized emissions. (Air Quality)

2. Compliance Offset Protocol for Ozone Depleting Substances Projects

Implementation of projects consistent with this compliance offset protocol would not be expected to result in any significant environmental impacts.

3. Compliance Offset Protocol for Livestock (Digesters) Projects

Implementation of projects consistent with this proposed compliance offset protocol could result in the following potentially significant impacts:

- The transport, storage, and pre-processing of manure and organic wastes for new community digester facilities could expose sensitive receptors to objectionable odors.
- Construction of new digesters could disturb, alter, or demolish historical resources, significant or unique archaeological resources, undocumented human remains, or unique paleontological resources or sites.
- Construction and operation of new digesters could expose sensitive receptors to noise and vibration levels in excess of applicable standards, and,
- Construction traffic could result in conditions that conflict with local traffic regulations and/or create hazardous conditions resulting from road closures, detours, and/or obstruction of emergency vehicles.

4. Compliance Offset Protocol for Urban Forest Projects

Implementation of projects consistent with this proposed compliance offset protocol could result in the following potentially significant impacts:

- Urban forest projects could disturb, alter, or demolish historical resources, significant or unique archaeological resources, undocumented human remains, or unique paleontological resources or sites.

5. Compliance Offset Protocol for Forest Offset Projects

Implementation of projects consistent with this proposed compliance offset protocol could result in the following potentially significant impacts:

- Reforestation projects could result in habitat changes that could adversely impact existing habitats and wildlife.
- Avoided conversion projects could conflict with local land use plans by maintaining forest on land planned for non-forest uses (land use).

C. Significant and Irreversible Environmental Changes

CEQA requires than an environmental analysis include an evaluation of the extent to which a proposed action would commit resources to uses that future generations would be unable to reverse. [CEQA Guidelines Section 15126(f); 15127]

Implementation of the cap-and-trade regulation with the proposed compliance offset protocols could result in the long-term commitment of onsite resources at covered entity facilities and livestock offset project sites to developed use. In context, the acreage committed to long-term use by these actions is relatively insignificant, generally consisting of building footprints, utility trenches, and manure lagoons.

Implementation of the ODS Offset Protocol would not commit environmental resources to long-term use, but would result in the irreversible destruction of materials that contain ODS.

The Urban Forest Offset Protocol and the Forest Offset Protocol would commit lands to the long-term growth of trees and forest management practices that sequester carbon. These actions represent a long-term contractual commitment, but are actions that could be physically reversed and, as such, do not commit resources to an irreversible use. The long-term habitat changes from reforestation projects under the Forest Offset Protocol could irreversibly displace wildlife that might occur in existing habitats.

These potential impacts could be irreversible consequences of the proposed cap-and-trade regulation, and are appropriately discussed in the relevant sections of this FED.

D. Relationship Between Short-Term Use of the Environment and the Maintenance of Long-Term Productivity

The cap-and-trade regulation and accompanying compliance offset protocols are long-term commitments to reduce GHG emissions, contributing to reduction of the adverse environmental consequences attributed to global warming.

Implementation of the cap-and-trade regulation and the proposed compliance offset protocols could result in compliance actions that could include construction to

accommodate improvements at existing industrial facilities and livestock digesters in rural locations. Implementation of the ODS Offset Protocol would not commit environmental resources to long-term use. The Urban Forest Offset Protocol and the Forest Offset Protocol could commit lands to the long-term growth of trees and forest management practices that sequester carbon.

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10.0 APPENDICES

A. Regulatory Framework

1. Aesthetics Regulatory Setting

a. Federal Regulations

Numerous federal laws require all federal land management agencies to consider scenery and aesthetic resources in land management planning, resource planning and project design, implementation and monitoring. The following federal statutes contain language that is protective of aesthetic and scenic resources:

- Wilderness Act of 1964
- Wild and Scenic Rivers Act of 1968
- National Trails System Act of 1968
- National Environmental Policy Act of 1969
- Forest and Rangeland Renewable Resources Planning Act of 1974
- Surface Mining Control and Reclamation Act of 1977
- Public Rangelands Improvement Act of 1978

Federal Land Policy and Management Act of 1976 (FLPMA)

FLPMA is the enabling legislation establishing the U.S. BLM's responsibilities for lands under its jurisdiction.

Section 102 (a) of the FLPMA states that ". . . the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values …. "

Section 103 (c) identifies "scenic values" as one of the resources for which public land should be managed.

Section 201 (a) states that "The Secretary shall prepare and maintain on a continuing basis an inventory of all public lands and their resources and other values (including... scenic values) ...."

Section 505 (a) requires that "Each right-of-way shall contain terms and conditions which will...minimize damage to the scenic and esthetic (sic) values...."

Section 601 includes direction on the California Desert Conservation Area (CDCA). Plans are established for different areas with the goal of providing for the use public

lands, and resources of the CDCA, including economic, educational, scientific, and recreational uses, in a manner which enhances wherever possible—and which does not diminish, on balance—the environmental, cultural, and aesthetic values of the Desert and its productivity.

California Desert Conservation Area (CDCA) Plan

Areas of California are located within the California Desert Conservation Area Plan, which is the U.S. BLM Resource Management Plan applicable to the project site (USDOI, 1980, as amended). The CDCA Plan did not include Visual Resource Management (VRM) inventory or management classes. However, the U.S. BLM developed updated Visual Resource Inventory (VRI) mapping in 2008 (USDOI, 2008).

The Ivanpagh Solar Electric Generating Systems (ISEGS) site is classified in the CDCA Plan October 2009 6.12-5 VISUAL RESOURCES as Multiple-Use Class (MUC) L (Limited Use). Multiple-Use Class L, the most restrictive under the plan, "protects sensitive, natural, scenic, ecological, and cultural resource values. Public lands designated as Class L are managed to provide for generally lower-intensity, carefully controlled multiple use of resources, while ensuring that sensitive values are not significantly diminished."

The CDCA Plan includes a table (Table 1) which illustrates the types of allowable land uses by MUC Class. The table specifically includes Electrical Power Generation Facilities including Wind/Solar facilities.

Bureau of Land Management Contrast Rating System

The contrast rating system is a systematic process used by the U.S. BLM to analyze visual impacts of proposed projects and activities. It is primarily intended to assist the U.S. BLM personnel in the resolution of visual impact assessment.

National Historic Preservation Act (NHPA)

Under regulations of the NHPA, visual impacts to a listed or eligible National Register property that may diminish the integrity of the property's "setting . . .[or] . . . feeling" in a way that affects the property's eligibility for listing, may result in a potentially significant adverse effect. "Examples of adverse effects . . . include . . .: Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features." (36 CFR Part 800.5.)

Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) – pertains to Transportation

SAFETEA-LU includes numerous provisions for improvements and changes to the implementation of transportation enhancement activities, which are funded by a ten percent set aside of Surface Transportation Program funds that are earmarked for transportation enhancement projects. SAFETEALU includes a list of qualifying transportation enhancement activities which include several items supportive of visual quality enhancement such as acquisition of scenic easements and scenic or historic sites, scenic or historic highway programs, landscaping or other scenic beautification,

and control and removal of outdoor advertising, among others. Transportation enhancement activities are not required to have a direct link to surface transportation, and they are sufficiently qualified if they merely relate to surface transportation.

b. State Regulations

California Department of Transportation (Caltrans) Scenic Highway Program

The California Scenic Highway Program was created by the State legislature in 1963 to preserve and protect scenic highway corridors from change that would reduce the aesthetic value of lands adjacent to highways. The State Scenic Highway System includes a list of highways that are either eligible for designation as scenic highways or have been so designated. A highway may be designated scenic depending upon how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon the traveler's enjoyment of the view. To be included in the State program, the highways proposed for designation must meet Caltrans' eligibility requirements and have visual merit. The status of a state scenic highway changes from eligible to officially designated when the local jurisdiction adopts a scenic corridor protection program, applies to the California Department of Transportation for scenic highway approval, and receives notification from Caltrans that the highway has been designated as a Scenic Highway.

c. Local Regulations

County and City Controls

Most local planning guidelines to preserve and enhance the visual quality and aesthetic resources of urban and natural areas are established in the jurisdiction's General Plan. The value attributed to a visual resource generally is based on the characteristics and distinctiveness of the resource and the number of persons who view it. Vistas of undisturbed natural areas, unique or unusual features forming an important or dominant portion of a viewshed, and distant vistas offering relief from less attractive nearby features are frequently considered to be scenic resources. In some instances, a case-by-case determination of scenic value may be needed, but often there is agreement within the relevant community about which features are valued as scenic resources. In addition to federal and State designations, counties and cities have their own scenic highway designations, which are intended to preserve and enhance existing scenic resources. Criteria for designation are commonly included in the conservation/open space element of the city or County General Plan. Cities and counties can use open space easements as a mechanism to preserve scenic resources, if they have adopted open-space plans, as provided by the Open Space Easement Act of 1974 and codified in California Government Code (Section 51070 et seq.) According to the Act, a city or County may acquire or approve an open-space easement through a variety of means, including use of public money.

Designated State and Local Scenic Highways

California's Scenic Highway Program was created by the Legislature in 1963. Its purpose is to preserve and protect scenic highway corridors from change which would diminish the aesthetic value of lands adjacent to highways. The program is administered by Caltrans and consists of laws, incentives, and guidelines that are intended to protect the scenic, historic, and recreational resources within designated scenic highway corridors. A scenic highway corridor is defined by Caltrans as the area of land generally adjacent to and visible from the highway (Caltrans 1996). It is usually limited by topography and/or jurisdictional boundaries. State goals for scenic highways include the following:

1. preserve and enhance the unique visual, biological, and ecological resources of the Scenic Highway Corridor;

2. prevent and eliminate (when reasonably possible) conditions that detract from or compromise the quality of the aesthetic resources of the Scenic Highway Corridor;

3. encourage the development and maintenance of park and recreational facilities that contribute to the aesthetic quality of the Scenic Highway Corridor;

4. encourage preservation of historical landmarks adjacent to the Scenic Highway Corridor; and

5. encourage community civic groups to create programs that increase community interest in the visual assets of the Scenic Highway Corridor and facilitate the implementation of such programs.

2. Agricultural Resources Regulatory Setting

a. Federal Regulations

Farmland Protection Policy Act (FPPA)

The FPPA is administered by the NRCS. The NRCS maps soils and farmland uses to provide comprehensive information necessary for understanding, managing, conserving and sustaining the nation's limited soil resources. The NRCS determines impacts to farmland that could occur due to a proposed project. The determination is made through coordination between the federal agency proposing or supporting the project and NRCS. NRCS will make a determination, using set thresholds, as to whether additional project-specific mitigation would be required. The FPPA is intended to minimize the impact Federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. It assures that—to the extent possible—Federal programs are administered to be compatible with state, local units of government, and private programs and policies to protect farmland.

Federal agencies are required to develop and review their policies and procedures to implement the FPPA every two years. For the purpose of FPPA, farmland includes

prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forest land, pastureland, cropland, or other land, but not water or urban built-up land.

b. State Regulations

The California Land Conservation Act (Williamson Act)

The California Land Conservation Act, better known as the Williamson Act, was enacted by the California State Legislature in 1965 to encourage the preservation of agricultural lands. The Williamson Act program permits property tax adjustments for landowners who contract with a city or county to keep their land in agricultural production or approved open space uses for at least 10 years. Lands covered by Williamson Act contracts are assessed on the basis of their agricultural value instead of their potential market value under nonagricultural uses. In return for the preferential tax rate, the landowner is required to contractually agree to not develop the land for a period of at least 10 years. Williamson Act contracts are renewed annually for 10 years unless a party to the contract files for nonrenewal. The filing of a non-renewal application by a landowner ends the automatic annual extension of a contract and starts a 9-year phase-out of the contract. During the phase-out period, the land remains restricted to agricultural and open-space uses, but property taxes gradually return to levels associated with the market value of the land. At the end of the 9-year non-renewal process, the contract expires and the owner's uses of the land are restricted only by applicable local zoning. The Williamson Act defines compatible use of contracted lands as any use determined by the county or city administering the agricultural preserve to be compatible with the agricultural, recreational, or open space use of land within the preserve and subject to contract (Government Code, Section 51202[e]). However, uses deemed compatible by a county or city government must be consistent with the principles of compatibility set forth in Government Code, Section 51238.1. (also discussed in the Land Use regulatory discussion)

Farmland Mapping and Monitoring Program (FMMP)

In 1982, the California created the Farmland Mapping and Monitoring Program (FMMP) within the DOC to carry on the mapping activity from the NRCS on a continuing basis. The FMMP is a nonregulatory program that provides consistent and impartial analysis of agricultural land use and land use changes throughout California for use by decision-makers in assessing present status, reviewing trends, and planning for the future of California's agricultural land resources. The FMMP produces Important Farmland Maps, which are a hybrid of resource quality (soils) and land use information. Information from the FMMP was used to identify agricultural resources within the MTP Plan Area. The FMMP is the primary system by which the extent, distribution, and quality of farmland is evaluated and monitored. Maps of Important Farmland are prepared periodically (approximately every 2 years) by the FMMP for most of the state's agricultural regions, based on soil survey information and land inventory and monitoring criteria developed by the NRCS.

c. Local Regulations

General Plans

The most comprehensive land use planning for a region is provided by city and county general plans, which local governments are required by state law to prepare as a guide for future development. The general plan contains goals and policies concerning topics that are mandated by state law or which the jurisdiction has chosen to include such as: land use, conservation and open space, natural resources, parks and recreation, and agricultural elements. City and county general plans must be consistent with each other. County general plans must cover areas not included by city general plans (i.e., unincorporated areas).

Community and Specific Plans

A city or county may also provide land use planning by developing community or specific plans for smaller, more specific areas within their jurisdiction. These more localized plans provide for focused guidance for developing a specific area, with development standards tailored to the area, as well as systematic implementation of the general plan.

Zoning

The city or county zoning code is the set of detailed requirements that implement the general plan policies at the level of the individual parcel. The zoning code presents standards for different uses and identifies which uses are allowed in the various zoning districts of the jurisdiction. Since 1971, state law has required the city or county zoning code to be consistent with the jurisdiction's general plan, except in charter cities, such as Auburn, Colfax, Folsom, Marysville, Roseville, and Sacramento.

Public Ownership, Purchase of Development Rights, and Open Space Acquisition:

Local governments and special districts, either on their own or working with land trusts and conservancies, can acquire fee title to agricultural and open space lands or purchase development rights to preserve rural and agricultural areas, watersheds, or critical habitat, or to create public parks and recreational areas.

3. Air Quality Regulatory Setting

Responsibility for air quality planning involves a wide variety of agencies and groups at the federal, state, regional, and local levels. Some of these agencies have actual regulatory authority, while others are responsible for development and implementation of programs and procedures aimed at reducing air pollution levels.

a. Federal Regulations

Clean Air Act of 1970 and Amendments

The federal Clean Air Act (CAA) of 1970, amended in 1977 and 1990 (42 USC 7506(c)), was enacted for the purposes of protecting and enhancing the nation's air resources to benefit public health. The CAA Amendments of 1990 represented a substantial update

of the act. In 1971, to achieve the purposes of Section 109 of the act, the U.S. EPA promulgated NAAQS for air pollutants that pose a threat to human health and welfare. The NAAQS require that certain pollutants should not exceed specified levels; areas that exceed the standard for specified pollutants are designated as "non attainment" areas. Six pollutants of primary concern were designated: ozone, carbon mo NO_xide (CO), sulfur dioxide (SO2), NO_2, lead, respirable particulate matter with an aerodynamic resistance diameter of 10 microns or less (PM_{10}), and $PM_{2.5}$. In promulgating the NAAQS, the U.S. EPA allowed some states the option to develop stricter state standards. As such, California has adopted its own set of stricter standards under the California Clean Air Act (CCAA) of 1988. If an area does not meet the federal NAAQS, federal clean air planning requirements specify that states develop and adopt SIPs, which are air quality plans showing how air quality standards will be attained. In California, the U.S. EPA has delegated authority to prepare SIPs to the ARB, which, in turn, has delegated that authority to individual air districts. SIPs must be prepared by each State and are submitted to the U.S. EPA for review and approval.

As required by the Clean Air Act, the U.S. EPA must:

- Identify those air pollutants that pose a threat to human health;
- Publish criteria for these air pollutant compounds based on the most recent scientific knowledge about the compounds, their interactions, and their effects on human health;
- Include measures and control techniques for these pollutants; and
- Identify the national AAQS for each criteria air pollutant in order to protect public health and welfare.

NAAQSs consist of two parts: the allowable concentration of a criteria pollutant, and the average time period during which the pollutant is to be measured. The concentration standard for the pollutant is based on studies of the effect of the pollutant on human health, crops, vegetation, and in some cases materials (e.g., paint). The average time period is typically based on the adverse effect caused by exposure to that pollutant. Damage from the pollutant is evaluated based on exposure to a high concentration over a short period of time (e.g., one hour) or to a low concentration during a longer period (e.g., eight hours or 24 hours). Some pollutants are evaluated for both time periods due to their effects over the short and long-term.

Transportation Conformity Analysis

The CAA requires that federally funded or approved transportation plans, programs, and projects in nonattainment or maintenance areas conform to the SIP for meeting the NAAQS. Transportation conformity must be assessed for all non-attainment area transportation-related pollutants classified as regional pollutants. This process involves forecasting future air pollutant emissions to determine whether the amount of pollution expected to result from the plan, program, or project would be within the allowable limit

for motor vehicle emissions of ozone precursors. Transportation projects also generate CO and PM10, which are considered localized pollutants. CO and PM10 micro-scale analyses are required in CO and PM10 non-attainment areas, respectively, to determine whether a transportation project would cause or contribute to localized violations of the NAAQS for CO or PM10.

On May 6, 2005, the U.S. EPA issued a final rule (70 CFR 24280) amending the transportation conformity regulations to add new provisions for the emission of $PM_{2.5}$. Typically, conformity for a federally funded individual transportation project is assessed by evaluating whether the project is included in a conforming metropolitan transportation plan and transportation improvement program (TIP). If the air pollutant emissions associated with the MTP and TIP are within the allowable motor vehicle ozone precursor emissions budgets, then no further assessment of the individual project or plan's contribution to regional ozone levels is needed. The conformity regulations further require that transportation projects be evaluated to determine whether they would cause or contribute to violations of the federal CO or PM10 ambient standards in areas designated as nonattainment or maintenance for these pollutants. However, transportation conformity applies only to operational emissions associated with a project. CO and PM10 hot-spot analyses are not required for construction-related activities. When an air quality analysis must be prepared, the analysis must be performed using the current U.S. EPA-approved transportation emissions model.

In June 2004, the U.S. EPA finalized amendments to the transportation conformity rule to 1) provide transportation conformity regulations for the new 8-hour ozone and $PM_{2.5}$ NAAQS, 2) incorporate existing federal guidance that is consistent with a U.S. Court of Appeals decision, and 3) streamline and improve U.S. EPA's existing transportation conformity rule.

Regional emissions conformity is achieved if the projected emission inventories are within the budget emissions for the air basin for each milestone year.

b. State Regulations

CARB Mobile-Source Regulation

California is responsible for controlling emissions from the operation of motor vehicles in the state. Rather than mandating the use of specific technology or the reliance on a specific fuel, the CARB's motor vehicle standards specify the allowable grams of pollution per mile driven. In other words, the regulations focus on the reductions needed rather than on the manner in which they are achieved. Towards this end, the CARB has adopted regulations which require auto manufacturers to phase in less polluting vehicles between 1994 and 2003.

Assembly Bill 1493

While climate change has been a concern since at least 1988, as evidenced by the establishment of the United Nations and World Meteorological Organization's Intergovernmental Panel on Climate Change (IPCC), the efforts devoted to GHG1

emissions reduction and climate change research and policy have increased dramatically in recent years. In 2002, with the passage of AB 1493, California launched an innovative and pro-active approach to dealing with GHG emissions and climate change at the state level. AB 1493 requires the ARB to develop and implement regulations to reduce automobile and light truck GHG emissions; these regulations will apply to automobiles and light trucks beginning with the 2009 model year.

California Executive Orders S-3-05 and S-20-06, and Assembly Bill 32

On June 1, 2005, Governor Arnold Schwarzenegger signed Executive Order S-3-05. The goal of this Executive Order is to reduce California's GHG emissions to: 1) 2000 levels by 2010, 2) 1990 levels by the 2020 and 3) 80% below the 1990 levels by the year 2050. In 2006, this goal was further reinforced with the passage of AB 32. AB 32 sets the same overall GHG emissions reduction goals while further mandating that ARB create a plan, which includes market mechanisms, and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases." Executive Order S-20-06 further directs state agencies to begin implementing AB 32, including the recommendations made by the state's Climate Action Team. For further discussion on these regulations, see Chapter 9, Energy and Global Climate Change. Climate change and GHG reduction is also a concern at the federal level; however, at this time, no legislation or regulations have been enacted specifically addressing GHG emission reductions and climate change. ARB, which is part of Cal-EPA, develops air quality regulations at the state level. The state regulations mirror federal regulations by establishing industry-specific pollution controls for criteria pollutants, TACs, and nuisance pollutants. California also requires areas to develop plans and strategies for attaining California AAQS as set forth in the California Clean Air Act of 1988. In addition to developing regulations, ARB develops motor vehicle emission standards for California vehicles. California Clean Air Act of 1988 (CCAA), which was approved by the California Legislature in 1988, establishes the framework for addressing air quality issues in the State. The Act created air quality goals, planning mechanisms, regulatory policies, and specific strategies, which in many cases were more stringent than the Federal standards. The Act requires the attainment of California AAQS; however, for those air districts that are in violation of State ozone, carbon mo NO_xide, sulfur dioxide, or NO_2 standards, individual special attainment plans are required.

State Air Quality Standards

As noted previously the California has adopted its own set of stricter standards for most of the federal criteria pollutants under the CCAA. These are referred to as the California AAQS. Similar to the federal standards, the California standards have been designed to protect the most sensitive persons from illness or discomfort with a margin of safety. In most cases, the State standards are more stringent than federal standards, and in the case of respirable particulate matter PM10 and sulfur dioxide, far more stringent. With regard to mobile-source control measures, ARB establishes emission standards for on-road motor vehicles sold in California. These standards are more stringent than the federal standards. With respect to stationary- and area-source control measures, CARB works closely with air districts in the development of model station- and area-source rules for possible adoption by individual air districts. In addition, the CARB

works closely with the air districts in controlling pollution from agricultural burning. The primary role is to determine permissible burn days and to fund research toward alternatives to or reducing agricultural burning.

c. Local Regulations

Air Districts

Air Districts have primary responsibility for preparation, adoption, and implementation of mobile, stationary, and area emission control measures and for the preparation of the SIP and any amendments.

Indirect Source Review Programs

Indirect sources are facilities that attract or generate motor vehicle activity, such as commercial areas or shopping malls, entertainment venues, or tourist attractions. California clean air legislation and regulations require indirect sources to mitigate their impact where necessary to attain the State's clean air standards. To this end, local governments and regulatory agencies require at the design phase of such proposed projects the incorporation of features that will reduce the need for vehicle trips to and from the source. Such features can include improved transit access, mixed land uses to enable workers to live in closer proximity to jobs, and aggressive public information and marketing efforts to educate the public on the availability of alternatives to single-occupancy vehicle use.

4. Biological Resources Regulatory Setting

a. Federal Regulations

The following discussion focuses on the federal requirements associated with subsequent CEQA compliance for project-specific analysis. Additional federal requirements would apply to subsequent projects that receive federal funding or otherwise affect federal lands and federal decision-making; these additional requirements may not apply to the adoption and implementation of the Scoping Plan but would need to be addressed if federal funding or another federal action (e.g., if federal lands were crossed or a federal permit were required) were triggered at the time of consideration and approval of the specific project. The regulatory Framework, Appendix A of this FED, provides a more detailed overview of the likely federal requirements (including requirements for biological resources) of obtaining federal action approvals for the subsequent projects.

Endangered Species Act

The Endangered Species Act (ESA) protects fish and wildlife species and their habitats that have been identified by USFWS or the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) as threatened or endangered. *Endangered* refers to species, subspecies, or distinct population segments that are in danger of extinction through all or a significant portion of their range. *Threatened* refers to species, subspecies, or distinct population segments that are likely to become endangered in the near future. The ESA is administered by

USFWS and the NMFS. In general, NMFS is responsible for protection of ESA-listed marine species and anadromous fish, whereas other listed species are under USFWS jurisdiction.

Clean Water Act

The CWA was enacted as an amendment to the federal Water Pollution Control Act of 1972, which outlined the basic structure for regulating discharges of pollutants to waters of the United States. The CWA serves as the primary federal law protecting the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands. The CWA empowers the U.S. EPA to set national water quality standards and effluent limitations and includes programs addressing both point source and nonpoint-source pollution. Point-source pollution is pollution that originates or enters surface waters at a single, discrete location, such as an outfall structure or an excavation or construction site. Nonpoint-source pollution originates over a broader area and includes urban contaminants in stormwater runoff and sediment loading from upstream areas. The CWA operates on the principle that all discharges into the nation's waters are unlawful unless specifically authorized by a permit; permit review is the CWA's primary regulatory tool.

Migratory Bird Treaty Act

Makes it unlawful to take or possess any migratory nongame bird (or any part of such migratory nongame bird) as designated in the Migratory Bird Treaty Act.

Clean Water Act

Requires the permitting and monitoring of all discharges to surface water bodies. Section 404 requires a permit from the U.S. Army Corps of Engineers (USACE) for a discharge from dredged or fill materials into Waters of the U.S., including wetlands. Section 401 requires a permit from a regional water quality control board (RWQCB) for the discharge of pollutants. By federal law, every applicant for a federal permit or license for an activity that may result in a discharge into a California water body, including wetlands, must request state certification that the proposed activity would not violate state and federal water quality standards.

U.S. Environmental Protection Agency (U.S. EPA) Section 404 (b)(1) Guidelines

Requires the USACE to analyze alternatives in a sequential approach such that the USACE must first consider avoidance and minimization of impacts to the extent practicable to determine whether a proposed discharge can be authorized.

Federal NO_xious Weed Act of 1974 (P.L. 93-629) (7 U.S.C. 2801 et seq.; 88 Stat. 2148)

Establishes a federal program to control the spread of NO_xious weeds. Authority is given to the Secretary of Agriculture to designate plants as NO_xious weeds by regulation, and the movement of all such weeds in interstate or foreign commerce was prohibited except under permit.

Bald and Golden Eagle Protection Act

Declares it is illegal to take, possess, sell, purchase, barter, offer to sell or purchase or barter, transport, export or import a bald or golden eagle, alive or dead, or any part, nest or egg of these eagles unless authorized. Active nest sites are also protected from

National Forest Management Act (NFMA)

Requires USFS to provide for a diversity of plant and animal communities as part of its multiple use mandate. NFMA regulations require that each forest prepare a plan that provides the strategic direction for managing the land and its resources over the next 10 to 15 years. USFS must maintain viable populations of existing native and desired non-native species in the planning area. The Regional Forester designates sensitive and management indicator species as part of a proactive approach to ensuring biodiversity is maintained.

Healthy Forests Restoration Act

Healthy Forests Restoration Act (HFRA) contains a variety of provisions to speed up hazardous-fuel reduction and forest-restoration projects on specific types of Federal land that are at risk of wildland fire and/or of insect and disease epidemics. The HFRA helps States, Tribes, rural communities and landowners restore healthy forest and rangeland conditions on State, Tribal, and private lands.

On lands meeting specific criteria, it provides streamlined approaches to satisfy NEPA requirements for collaboratively selected fuels treatment projects. The provisions of HFRA can be applied to as many as 20,000,000 acres of land managed by the USFWS and BLM.

HFRA provides authority for expedited vegetation treatments on certain types of USFS and BLM lands that: (a) are at risk of wildland fire, (b) have experienced windthrow, blowdown, or ice-storm damage, (c) are currently experiencing disease or insect epidemics, or (d) are at imminent risk of such epidemics because of conditions on adjacent land. In addition, FHMA encourages biomass removal from public and private lands and authorizes the acquisition of Healthy Forest Reserves on private land to promote recovery of threatened and endangered species, and improve biodiversity and carbon sequestration.

b. State Regulations

Z'berg-Nejedly Forest Practice Act

Z'Berg-Nejedly Forest Practices Act (FPA) ensures that logging on privately owned lands in California is done in a manner that will preserve and protect fish, wildlife, forests, and streams. This act established a nine member Board of Forestry whose mandate was the control over forest practices and forest resources in California. The Board of Forestry is the policy arm of the California Department of Forestry (CALFIRE), which is the enforcement branch.

The Forest Practice Act requires that a Timber Harvest Plan (THP) be prepared by a Registered Professional Forester for timber harvest on virtually all non-federal land. THPs are submitted to CALFIRE for its review prior to approval. The THP process is the functional equivalent of an EIR under CEQA. The Forest Practice Act also established the requirement that all non-federal forests cut in the State be regenerated with at least three hundred stems per acre on high site lands, and one hundred fifty trees per acre on low site lands.

California Forest Practice Rules 2010

State Board of Forestry has authority delegated by legislature to adopt forest practice and fire protection regulations on non federal lands. These regulations carry out California legislature's mandates to protect and enhance the State's unique forest and wildland resources.

California Endangered Species Act

California implemented CESA in 1984. The act prohibits the take of endangered and threatened species; however, habitat destruction is not included in the state's definition of take. Under CESA, take is defined as an activity that would directly or indirectly kill an individual of a species, but the definition does not include harm or harassment. Section 2090 of CESA requires state agencies to comply with endangered species protection and recovery and promote conservation of these species. DFG administers the act and authorizes take through Section 2081 agreements (except for species designated as fully protected). Regarding rare plant species, CESA defers to the California Native Plant Protection Act of 1977, which prohibits importing rare and endangered plants into California, taking rare and endangered plants, and selling rare and endangered plants. State-listed plants are protected mainly in cases where state agencies are involved in projects under CEQA. In these cases, plants listed as rare under the California Native Plant Protection Act are not protected under CESA but can be protected under CEQA.

Porter-Cologne Water Quality Control Act

Water Code Section 13260 requires "any person discharging waste, or proposing to discharge waste, in any region that could affect the waters of the state to file a report of discharge (an application for waste discharge requirements)." Under Porter-Cologne, waters of the state is defined as "any surface water or groundwater, including saline waters, within the boundaries of the state." The SWANCC ruling and Rapanos decision, described above, have no bearing on the Porter-Cologne definition. Although all waters of the United States that are within the borders of California are also waters of the state, the converse is not true (i.e., in California, waters of the United States represent a subset of waters of the state). Thus, California retains authority to regulate discharges of waste into any water of the state, regardless of whether the Corps has concurrent jurisdiction under CWA section 404. If the Corps determines that a wetland is not subject to regulation under CWA Section 404, Section 401 water quality certification is not required. However, the RWQCB may impose waste discharge requirements (WDRs) if fill material is placed into waters of the state.

California Fish and Game Code Section 1602

Under Section 1602 of the California Fish and Game Code, public agencies are required to notify DFG before undertaking any project that would divert, obstruct, or change the natural flow, bed, channel, or bank of any river, stream, or lake. Preliminary notification and project review generally occur during the environmental process. When an existing fish or wildlife resource may be substantially adversely affected, DFG is required to propose reasonable project changes to protect the resources. These modifications are formalized in a streambed alteration agreement that becomes part of the plans, specifications, and bid documents for the project.

California Oak Woodlands Conservation Act

The California Oak Woodlands Conservation Act was enacted in 2001 to protect oak woodland habitats that were being diminished by development, firewood harvesting, and agricultural conversions. The Oak Woodlands Conservation Program was established as a result of the act and is intended to provide project funding opportunities for private landowners, conservation organizations, and cities and counties to conserve and restore oak woodlands. The program authorizes the Wildlife Conservation Board to purchase oak woodland conservation easements and provide grants for land improvements and oak restoration efforts.

Fully Protected Species (Fish and Game Code Sections 3511,4700, 5050, and 5515)

The Fish and Game code identifies several amphibian, reptile, fish, bird and mammal species which are Fully Protected. DFG cannot issue a take permit), except for take related to scientific research.

California Environmental Quality Act (CEQA Guidelines section 15380)

CEQA defines rare species more broadly than the definitions for species listed under the state and federal Endangered Species Acts. Under section 15830, species not protected through state or federal listing but nonetheless demonstrable as “endangered” or “rare” under CEQA should also receive consideration in environmental analyses. Included in this category are many plants considered rare by the California Native Plant Society (CNPS) and some animals on the CDFG’s Special Animals List.

c. Local Regulations

Habitat Conservation Plans/Natural Community Conservation Plans

During implementation of specific projects, an activity subject to Section 10 of the Endangered Species Act and considered a covered project under the implementing rules of an adopted HCP or NCCP may be able to participate in the plan for effects on covered species.

5. Cultural Resources Regulatory Setting

Archaeological and paleontological resources are frequently uncovered during construction of projects that require excavation, while historic resources are generally known. Strict mitigation and protection measures are required whenever such resources are discovered. In addition, there is a general requirement that a cultural resource survey and environmental analysis be prepared prior to commencement of any action, development, or land use change subject to CEQA or NEPA on lands subject to federal jurisdiction or for projects involving federal funds.

a. Federal Regulations

Section 106 of the National Historic Preservation Act

Specific regulations regarding compliance with Section 106 of the NHPA state that, although the tasks necessary to comply with Section 106 may be delegated to others, the federal agency is ultimately responsible for ensuring that the Section 106 process is completed according to statute. The Section 106 process is a consultation process that involves the SHPO throughout; the process also calls for including Native American Tribes and interested members of the public, as appropriate, throughout the process. Implementing regulations for Section 106 (36 CFR 800) detail the following five basic steps.

1) Initiate the Section 106 process.

2) Identify and evaluate historic properties.

3) Assess the effects of the undertaking on historic properties within the area of potential effects (APE).

4) If historic properties are subject to adverse effects, the federal agency, the SHPO, and any other consulting parties (including Native American tribes) continue consultation to seek ways to avoid, minimize, or mitigate the adverse effect. A memorandum of agreement (MOA) is usually developed to document the measures agreed upon to resolve the adverse effects.

5) Proceed in accordance with the terms of the MOA.

National Register of Historic Places

The NRHP is the official list of the nation's recognized cultural resources. Authorized under the NHPA (1966), the NRHP is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archaeological resources. The NPS, under the Secretary of the Interior, administers the NRHP. Properties listed in the NRHP include districts, sites, buildings, structures, and objects that are significant to American history, architecture, archaeology, engineering, and culture. These resources contribute to an understanding of the historical and cultural foundations of the nation.

The NRHP includes:

- All historic areas in the National Park System;
- National Historic Landmarks which have been designated by the Secretary of the Interior for their significance to all Americans; and
- Properties significant to the nation, state, or community which have been nominated by the states, federal agencies,
- and others, and which have been approved by the NPS.

Federal Historic Significance Criteria

For federal projects, cultural resource significance is evaluated in terms of eligibility for listing in the NRHP. NRHP criteria for eligibility are defined below.

The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling and association, and that:

- are associated with events that have made a contribution to the broad pattern of our history;
- are associated with the lives of people significant in our past;
- embody the distinct characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- have yielded, or are likely to yield, information important in prehistory or history (36 CFR 60.4).

American Indian Religious Freedom Act of 1978

The American Indian Religious Freedom Act pledges to protect and preserve the traditional religious rights of American Indians, Aleuts, Eskimos, and Native Hawaiians. Before the act was passed, certain U.S. federal laws interfered with the traditional religious practices of many American Indians. The Act establishes a national policy that traditional Native American practices and beliefs, sites (and right of access to those sites), and the use of sacred objects shall be protected and preserved.

Native American Graves Protection and Repatriation Act of 1990 (NAGPRA)

The intent of NAGPRA is to identify proper Native American ownership and ensure the rightful disposition, or repatriation, of Native American remains and items of cultural patrimony that are in federal possession or control. The regulations implementing the requirements of NAGPRA relating to the inadvertent discovery of human remains of Native American origin are described in 43 CFR 10.4.

Section 4(f) Requirements

Historic and cultural resources are also protected under regulations of the NHPA and the Department of Transportation Act of 1966. Section 4(f) of the Transportation Act requires a comprehensive evaluation of all environmental impacts resulting from federal-aid transportation projects administered by the Federal Highway Administration, Federal Transit Administration, and Federal Aviation Administration that involve the use—or interference with use—of the following types of land: Public park lands, Recreation areas, Wildlife and waterfowl refuges, Publicly or privately owned historic properties of federal, state, or local significance.

Detailed inventories of the locations and likely impacts on resources that fall into the Section 4(f) category are required in project-level environmental assessments.

In August 2005, Section 4(f) was amended to simplify the process and approval of projects that have only de minimis impacts on lands affected by Section 4(f). Under the new provisions, the U.S. Secretary of Transportation may find such a de minimis impact if consultation with the SHPO results in a determination that a transportation project will have no adverse effect on the historic site or that there will be no historic properties affected by the proposed action. In this instance, analysis of avoidance alternatives is not required and the Section 4(f) evaluation process is complete.

Native American Heritage Commission

The NAHC regulates Native American concerns toward the excavation and disposition of Native American cultural resources. Among its duties, the NAHC is authorized to resolve disputes relating to the treatment and disposition of Native American human remains and items associated with burials. Upon notification of the discovery of human remains by a County coroner, the NAHC notifies the Native American group or individual most likely descended from the deceased.

b. State Regulations

California Environmental Quality Act (CEQA)

CEQA requires that public agencies financing or approving public or private projects must assess the effects of the project on cultural resources. Furthermore, it requires that, if a project results in significant impacts on important cultural resources, alternative plans or mitigation measures must be considered; only significant cultural resources, however, need to be addressed. Thus, prior to the development of mitigation measures, the importance of cultural resources must be determined.

The State CEQA Guidelines define three ways that a cultural resource may qualify as a historical resource for the purposes of CEQA review:

- if the resource is listed in or determined eligible for listing in the CRHR;
- if the resource is included in a local register of historical resources, as defined in Public Resources Code (PRC) 5020.1(k), or is identified as significant in an historical resource survey meeting the requirements of PRC 5024.1(g) unless the preponderance of evidence demonstrates that it is not historically or culturally significant; or
- the lead agency determines the resource to be significant as supported by substantial evidence in light of the whole record (14 California Code of Regulations [CCR] 15064.5[a]).

Other Provisions of the California Public Resources Code

Unauthorized Actions

Section 5097.5 of the PRC specifically defines "unauthorized excavation, removal, destruction, etc. of archaeological, paleontological, or historical features on Public Lands as a misdemeanor.

Native American Heritage

California Public Resources code 5097.9 states that no public agency or a private party on a public property shall "interfere with the free expression or exercise of Native American Religion…" The code further states that

No such agency or party [shall] cause severe or irreparable damage to any Native American sanctified cemetery, place of worship, religious or ceremonial site, or sacred shrine…except on a clear and convincing showing that the public interest and necessity so require. County and city lands are exempt from this provision, except for parklands larger than 100 acres.

Human Remains

Disturbance of human remains without the authority of law is a felony (California Health and Safety Code, Section 7052). According to state law (California Health and Safety Code, Section 7050.5, California Public Resources Code, Section 5097.98), if human remains are discovered or recognized in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains until 1) the coroner of the county has been informed and has determined that no investigation of the cause of death is required; 2)and if the remains are of Native American origin, and if the descendants from the deceased Native Americans have made a recommendation to the landowner or the person responsible for the excavation work for means of treating or disposing of with appropriate dignity the human remains and any associated grave goods as provided in Public Resources Code Section 5097.98; or the NAHC was

unable to identify a descendent or the descendent failed to make a recommendation within 24 hours after being notified by the commission.

According to the California Health and Safety Code, six or more human burials at one location constitute a cemetery (Section 8100), and disturbance of Native American cemeteries is a felony (Section 7052). Section 7050.5 requires that construction or excavation be stopped in the vicinity of discovered human remains until the coroner can determine whether the remains are those of a Native American. If the remains are determined to be Native American, the coroner must contact the NAHC, who has jurisdiction over Native American remains (California Health and Safety Code, 7052.5c; Public Resources Code, Section 5097.98).

c. Local Regulations

In addition to federal and state regulations, many county and city general plans and ordinances address the identification maintenance, and protection of cultural resources. Local policies may either support or conflict with proposed project improvements.

County General Plans

Cultural resources are generally discussed in county general plans. Cultural resources are generally discussed in either the Open Space Element or the Conservation Element of the General Plan. Policies regarding cultural resources in General Plans call for the identification, protection, interpretation and enhancement of important historical, archaeological, paleontological, and cultural sites and their contributing environments.

Municipal Preservation

Many local municipalities include cultural resources preservation elements in their general plans that include some mechanism pertaining to cultural resources in those communities. In general, the sections pertaining to archaeological and historical properties are put in place to afford the cultural resources a measure of local protection. The policies outlined in the individual general plans should be consulted prior to any undertaking or project.

6. Energy Regulatory Setting

a. Federal Regulations

Energy Policy and Conservation Act

The Energy Policy and Conservation Act of 1975 sought to ensure that all vehicles sold in the U.S. would meet certain fuel economy goals. Through this Act, Congress established the first fuel economy standards for on-road motor vehicles in the United States (U.S.). Pursuant to the Act, the National Highway Traffic and Safety Administration, which is part of the U.S. Department of Transportation (USDOT), is responsible for establishing additional vehicle standards and for revising existing standards. Since 1990, the fuel economy standard for new passenger cars has been 27.5 mpg. Since 1996, the fuel economy standard for new light trucks (gross vehicle weight of 8,500 pounds or less) has been 20.7 mpg. Heavy-duty vehicles (i.e., vehicles

and trucks over 8,500 pounds gross vehicle weight) are not currently subject to fuel economy standards. Compliance with federal fuel economy standards is determined on the basis of each manufacturer's average fuel economy for the portion of its vehicles produced for sale in the U.S. The Corporate Average Fuel Economy (CAFE) program, administered by the U.S. EPA, was created to determine vehicle manufacturers' compliance with the fuel economy standards. The U.S. EPA calculates a CAFE value for each manufacturer based on city and highway fuel economy test results and vehicle sales. Based on the information generated under the CAFE program, the USDOT is authorized to assess penalties for noncompliance.

Energy Policy Act of 1992 (EPAct)

The Energy Policy Act of 1992 (EPAct) was passed to reduce the country's dependence on foreign petroleum and improve air quality. EPAct includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. EPAct requires certain federal, state, and local government and private fleets to purchase a percentage of light duty AFVs capable of running on alternative fuels each year. In addition, financial incentives are included in EPAct. Federal tax deductions will be allowed for businesses and individuals to cover the incremental cost of AFVs. States are also required by the act to consider a variety of incentive programs to help promote AFVs.

Energy Policy Act of 2005

The Energy Policy Act of 2005 was signed into law on August 8, 2005. Generally, the act provides for renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for a clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.

Intermodal Surface Transportation Efficiency Act

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) promoted the development of intermodal transportation systems to maximize mobility as well as address national and local interests in air quality and energy. ISTEA contained factors that metropolitan planning organizations (MPOs), such as SACOG, were to address in developing transportation plans and programs, including some energy-related factors. To meet the ISTEA requirements, MPOs adopted explicit policies defining the social, economic, energy, and environmental values that were to guide transportation decisions in that metropolitan area. The planning process was then to address these policies. Another requirement was to consider the consistency of transportation planning with federal, state, and local energy goals. Through this requirement, energy consumption was expected to become a criterion, along with cost and other values that determine the best transportation solution.

Transportation Equity Act for the 21st Century

On June 9, 1998, the Transportation Equity Act for the 21st Century or TEA-21 was signed into law. TEA-21 built on the work that originated under the ISTEA, which expired on September 30, 1997. TEA- 21 continued most of ISTEA's programs and policies and maintained ISTEA's emphasis on local involvement in transportation decision-making. TEA-21 was a 6-year, $217 billion authorization of federal highway, bridge, and transit programs for the period of October 1, 1997, through September 30, 2003. TEA-21 has made available nearly $218 billion in federal funds for highway, highway safety, and transit programs over 6 years. TEA-21 authorized a 42 percent increase in highway funds and a 31 percent increase in transit funds from ISTEA levels. TEA-21 guaranteed minimum funding of about $198 billion for federal highway, highway safety, and transit programs. Prior to TEA-21, funding for surface transportation programs was one priority among many competing for federal budget dollars. In particular, transit funding was guaranteed at fixed amounts over the 6 years for eligible projects. TEA-21 programs were funded in part through the Highway Trust Fund (HTF), which was established in 1956 and supported by fees levied on highway users, including fuel, tire, truck, and use taxes. TEA-21 ensured that each state receives a minimum return on the amount of gas taxes it contributes to the HTF.

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users

TEA-21 expired on September 30, 2003. The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), enacted August 10, 2005, renews the TEA-21 through FY 2009. SAFETEA-LU authorizes the federal surface transportation programs for highways, highway safety, and transit. SAFETEA-LU addresses the many challenges facing our transportation system today—challenges such as improving safety, reducing traffic congestion, improving efficiency in freight movement, increasing intermodal connectivity, and protecting the environment—as well as laying the groundwork for addressing future challenges. SAFETEA-LU promotes more efficient and effective federal surface transportation programs by focusing on transportation issues of national significance, while giving state and local transportation decision makers more flexibility to solve transportation problems in their communities.

Federal Climate Change Policy

According to the U.S. EPA, "the United States government has established a comprehensive policy to address climate change" that includes slowing the growth of emissions; strengthening science, technology, and institutions; and enhancing international cooperation. To implement this policy, "the Federal government is using voluntary and incentive-based programs to reduce emissions and has established programs to promote climate technology and science." The federal government's goal is to reduce the GHG intensity (a measurement of GHG emissions per unit of economic activity) of the American economy by 18 percent over the 10-year period from 2002 to 2012. In addition, the U.S. EPA administers multiple programs that encourage voluntary GHG reductions, including "ENERGY STAR", "Climate Leaders", and Methane Voluntary Programs. However, as of this writing, there are no adopted federal plans, policies, regulations, or laws directly regulating GHG emissions.

b. State Regulations

Assembly Bill 32, the California Climate Solutions Act of 2006 (Health and Safety Code § 38500 et seq.)

In September 2006, Governor Arnold Schwarzenegger signed AB 32 into law. AB 32 was intended to effectively end the scientific debate in California over the existence and consequences of global warming. In order to be effective, measures to reduce GHG will have to occur in connection with similar reductions by other states and countries.

Through AB 32, California is attempting to take on a leadership role in the abatement of climate change and offer a model for other states and countries to reduce GHG emissions. In general, AB 32 directs ARB to do the following:

- On or before June 30, 2007, CARB shall publicly make available a list of discrete early action GHG emissions reduction measures that can be implemented prior to the adoption of the statewide GHG limit and the measures required to achieve compliance with the statewide limit;

- By January 1, 2008, determine the statewide levels of GHG emissions in 1990, and adopt a statewide GHG emissions limit that is equivalent to the 1990 level (an approximately 25 percent reduction in existing statewide GHG emissions);

- On or before January 1, 2010, adopt regulations to implement the early action GHG emissions reduction measures;

- On or before January 1, 2011, adopt quantifiable, verifiable, and enforceable emissions reduction measures by regulation that will achieve the statewide GHG emissions limit by 2020, to become operative on January 1, 2012, at the latest. The emissions reduction measures may include direct emissions reduction measures, alternative compliance mechanisms, and potential monetary and non-monetary incentives that reduce GHG emissions from any sources or categories of sources as ARB finds necessary to achieve the statewide GHG emissions limit; and

- ARB shall monitor compliance with and enforce any emissions reduction measure adopted pursuant to AB 32.

AB 32 also takes into account the relative contribution of each source or source category to protect adverse impacts on small businesses and others by requiring ARB to recommend a minimum threshold of GHG emissions below which emissions reduction requirements would not apply.

AB 32 also allows the Governor to adjust the deadlines mentioned above for individual regulations or the entire state to the earliest feasible date in the event of extraordinary circumstances, catastrophic events, or threat of significant economic harm.

Senate Bill 1368

SB 1368 is the companion bill of AB 32 and was signed by Governor Schwarzenegger in September 2006. SB 1368 required the CPUC to establish a GHG emission performance standard for baseload generation from investor-owned utilities by February 1, 2007. Similarly, the CEC was tasked with establishing a similar standard for local publicly-owned utilities by June 30, 2007. These standards cannot exceed the GHG emission rate from a baseload combined-cycle natural gas fired plant. The bill further requires that all electricity provided to California, including imported electricity, be generated from plants that meet the standards set by the PUC and the CEC. In January 2007, the PUC adopted an interim GHG Emissions Performance Standard, which requires that all new long-term commitments for baseload generation entered into by investor-owned utilities have emissions no greater than a combined cycle gas turbine plant (i.e., 1,100 pounds of CO_2 per MWH). A "new long-term commitment" refers to new plant investments (new construction), new or renewal contracts with a term of 5 years or more, or major investments by the utility in its existing baseload power plants. In May 2007, the CEC approved regulations that prohibit the state's publicly-owned utilities from entering into long-term financial commitments with plants that exceed the standard adopted by the PUC of 1,100 pounds of CO_2 per MWH.

Senate Bill 1078

SB 1078 establishes a RPS for electricity supply. The RPS requires that retail sellers of electricity, including investor-owned utilities and community choice aggregators, provide 20 percent of their supply from renewable sources by 2017. This target date was moved forward by SB 107 to require compliance by 2010. In addition, electricity providers subject to the RPS must increase their renewable share by at least 1 percent each year. This legislation will impact regional transportation powered by electricity.

Assembly Bill 1493

In 2002, then Governor Gray Davis signed AB 1493. AB 1493 required the CARB to develop and adopt, by January 1, 2005, regulations that achieve "the maximum feasible reduction of GHGs emitted by passenger vehicles and light-duty truck and other vehicles determined by the ARB to be vehicles whose primary use is noncommercial personal transportation in the state." To meet the requirements of AB 1493, CARB approved amendments to the California Code of Regulations (CCR) adding GHG emission standards to California's existing motor vehicle emission standards in 2004. Amendments to CCR Title 13 Sections 1900 (CCR 13 1900) and 1961 (CCR 13 1961), and adoption of Section 1961.1 (CCR 13 1961.1) require automobile manufacturers to meet fleet average GHG emission limits for all passenger cars, light-duty trucks within various weight criteria, and medium-duty passenger vehicle weight classes beginning with the 2009 model year. Emission limits are further reduced each model year through 2016. For passenger cars and light-duty trucks 3,750 pounds or less loaded vehicle weight (LVW), the 2016 GHG emission limits are approximately 37 percent lower than the during the first year of the regulations in 2009. For medium-duty passenger vehicles and light-duty trucks 3,751 LVW to 8,500 pounds gross vehicle weight (GVW), GHG emissions are reduced approximately 24 percent between 2009 and 2016.

In December 2004, a group of car dealerships, automobile manufacturers, and trade groups representing automobile manufactures filed suit against the CARB to prevent enforcement of CCR 13 1900 and CCR 13 1961 as amended by AB 1493 and CCR 13 1961.1 (Central Valley Chrysler-Jeep et al., v. Catherine E. Witherspoon, in her official capacity as Executive Director of ARB et al.). The suit, being heard in the U.S. District Court for the Eastern District of California, contends that California's implementation of regulations that in effect regulate vehicle fuel economy violates various federal laws, regulations, and policies. To date, the suit has not been settled, and the judge has issued an injunction stating CARB cannot enforce the regulations in question before receiving appropriate authorization from the U.S. EPA. In January 2007, the judge hearing the case accepted a request from the State Attorney General's office that the trial be postponed until a decision is reached by the U.S. Supreme Court on a separate case addressing GHGs. In the Supreme Court Case, *Massachusetts vs. U.S. EPA*, the primary issue is whether the federal Clean Air Act (CAA) provides authority for the U.S. EPA to regulate CO_2 emissions. In April 2007, the U.S. Supreme Court ruled in Massachusetts' favor, holding that GHGs are air pollutants under the CAA. In May 2007, the U.S. EPA held two public hearings on CARB's request for the U.S. EPA authorization to implement the GHG reductions measure for motor vehicles required by AB 1493. As of this writing, the *Central Valley Chrysler-Jeep* case is still pending before the U.S. District Court in Eastern California and the U.S. EPA has not made a decision on CARB's request for authorization to implement the GHG reduction measure for motor vehicles.

Executive Order #S-3-05

Executive Order #S-3-05, signed by Governor Arnold Schwarzenegger on June 1, 2005, called for a reduction in GHG emissions to 1990 levels by 2020 and for an 80 percent reduction in GHG emissions to below 1990 levels by 2050. Executive Order #S-3-05 also calls for the California Environmental Protection Agency (CalEPA) to prepare biennial science reports on the potential impact of continued global warming on certain sectors of the California economy.

The first of these reports, *Scenarios of Climate Change in California: An Overview* (Climate Scenarios report), was published in February 2006 (California Climate Change Center 2006). The Climate Scenarios report uses a range of emissions scenarios developed by the Intergovernmental Panel on Climate Change (IPCC) to project a series of potential warming ranges (i.e., temperature increases) that may occur in California during the 21st century: lower warming range (3.0-5.5 degrees F); medium warming range (5.5-8.0 degrees F); and higher warming range (8.0-10.5 degrees F). The Climate Scenarios report then presents analysis of future climate in California under each warming range.

In addition to issuing Executive Order #S-3-05, Governor Schwarzenegger also has "worked to forge agreements with other states, regions and nations, including the United Kingdom (UK); Manitoba, Canada; and the Northeast/Mid-Atlantic states on reducing GHG and promoting low carbon technology. California, UK, and Manitoba commit to share experiences, find new solutions and take more aggressive action to address

climate change and promote energy diversity" (Climate Action Program at Caltrans, December 2006).

State of California Integrated Energy Policy Report

In 2002, the Legislature reconstituted the State's responsibility to develop an integrated energy plan for electricity, natural gas, and transportation fuels. The CEC adopts and transmits to the Governor and Legislature a report of findings every 2 years. At a Special Business Meeting on November 12, 2003, the CEC adopted the *2003 Integrated Energy Policy Report*. The *2004 Update to the Integrated Energy Policy Report* was adopted by the CEC on November 3, 2004.

The *2005 Integrated Energy Policy Report* was adopted by the CEC on November 21, 2005. These reports make recommendations to increase California's energy supplies, reduce energy demand, broaden the range of alternatives to conventional energy sources, and improve the State's energy delivery infrastructure.

In January 2007, the CEC published the *2006 Integrated Energy Policy Report Update*, which was created after input from stakeholders and federal, state, and local agencies. The report contains a review of two areas: "Renewable Portfolio Standard activities and the potential relationship between sustainable land use planning, also called 'smart growth,' and energy saving opportunities." The report also discusses California's "minimal progress to date in meeting Renewable Portfolio Standard goals, identifies challenges the state faces in achieving those goals, and offers recommendations." Further, the report "details the lack of relationship between land use planning activities and energy concerns and offer recommendations for taking advantage of potential energy efficiencies that smart growth would offer." (CEC, 2006 Integrated Energy Policy Report Update, January 2007.) In the report, the CEC notes that California's population is expected to grow by 20 million people between 2000 and 2050 and that this growth will strain California's energy and infrastructure system. The CEC concludes that land use decisions have a profound effect on every aspect of energy, which necessitates a shift in approaches to land use and development in light of the coming growth in California. The recommendations in the report are based on the conclusion that California "needs to investigate approaches that go beyond decreasing transportation fuel use and relieving congestion to approaches that can serve as a nexus for developing distributed renewable generation and efficient transportation in communities to help California meet its statewide energy and climate change goals." The report notes that the best opportunity for meeting this goal is to emphasize the principles of smart growth, which uses resources prudently and creates low-impact communities.

California Strategy to Reduce Petroleum Dependence (AB 2076)

AB 2076 (Chapter 936, Statutes of 2000) requires the CEC and the ARB to develop and submit to the Legislature a strategy to reduce petroleum dependence in California. The statute requires the strategy to include goals for reducing the rate of growth in the demand for petroleum fuels. In addition, the strategy is required to include recommendations to increase transportation energy efficiency as well as the use of non-petroleum fuels and advanced transportation technologies including alternative fuel

vehicles, hybrid vehicles, and high-fuel efficiency vehicles. The strategy, *Reducing California's Petroleum Dependence*, was adopted by the CEC and CARB in 2003. The strategy recommends that California reduce inroad gasoline and diesel fuel demand to 15 percent below 2003 demand levels by 2020 and maintain that level for the foreseeable future; the Governor and Legislature work to establish national fuel economy standards that double the fuel efficiency of new cars, light trucks, and sport utility vehicles (SUVs); and increase the use of nonpetroleum fuels to 20 percent of on-road fuel consumption by 2020 and 30 percent by 2030.

Alternative Fuels Plan Assembly Bill 1007

AB 1007 requires the CEC to prepare a state plan to increase the use of alternative fuels in California. Any environmental document prepared for a strategic growth plan, regional blueprint general plan metropolitan planning or transportation plan should include an evaluation of alternative fuels for emissions or criteria pollutants, TACs, GHGs, water pollutants, and other harmful substances, and their impacts on petroleum consumption, and set goals for increased alternative fuel use in the state for the next decades, and recommend policies to ensure the alternative fuel goals are attained, including standards on transportation fuels and vehicle and policy mechanisms to ensure vehicles operating on alternative fuels use those fuels to the maximum extent feasible.

Bioenergy Action Plan – Executive Order #S-06-06

Executive Order #S-06-06 establishes targets for the use and production of biofuels and biopower and directs state agencies to work together to advance biomass programs in California while providing environmental protection and mitigation. The executive order establishes the following target to increase the production and use of bioenergy, including ethanol and biodiesel fuels made from renewable resources: produce a minimum of 20 percent of its biofuels within California by 2010, 40 percent by 2020, and 75 percent by 2050. The Executive Order also calls for the state to meet a target for use of biomass electricity.

Governor's Low Carbon Fuel Standard (Executive Order #S-01-07)

Executive Order #S-01-07 establishes a statewide goal to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020 through establishment of the LCFS. The LCFS shall be incorporated into the State Alternative Fuels Plan required by AB 1007 and is one of the proposed discrete early action GHG reduction measures identified by CARB pursuant to AB 32. In January, 2010, the Office of Administrative Law approved the LCFS regulation.

Senate Bill 97 (SB 97)

SB 97 was signed by the Governor on August 24, 2007. This bill would provide that in an EIR, negative declaration, mitigated negative declaration, or other document required by CEQA for either transportation projects funded under the Highway Safety, Traffic Reduction, Air Quality and Port Security Bond Act of 2006, or projects funded under the Disaster Preparedness and Flood Prevention Bond Act of 2006, the failure to analyze adequately the effects of GHG emissions otherwise required to be reduced

pursuant to regulations adopted under the AB 32 does not create a cause of action for a violation of CEQA. The bill would provide that this provision shall apply retroactively for any of the above documents that are not final and shall be repealed on January 1, 2010. The bill required the Office of Planning and Research (OPR), by July 1, 2009, to prepare, develop, and transmit to the Resources Agency guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions, as required by CEQA, including, but not limited to, effects associated with transportation or energy consumption. The Resources Agency was required to certify and adopt those guidelines by January 1, 2010. The OPR is required to periodically update the guidelines to incorporate new information or criteria established by ARB pursuant to AB 32.

Climate Action Program at Caltrans

In December 2006, the California Department of Transportation, Business, Transportation, and Housing Agency, issued a Climate Action Program. The goal of the Climate Action Program is to promote clean and energy efficient transportation, and provide guidance for mainstreaming energy and climate change issues into business operations. The overall approach to lower fuel consumption and CO_2 from transportation is twofold: (1) reduce congestion and improve efficiency of transportation systems through smart land use, operational improvements, and Intelligent Transportation Systems; and (2) institutionalize energy efficiency and GHG emissions reduction measures and technology into planning, project development, operations, and maintenance of transportation facilities, fleets, buildings, and equipment. The reasoning underlying the Climate Action Program is the conclusion that "the most effective approach to addressing GHG reduction, in the short-to-medium term, is strong technology policy and market mechanisms to encourage innovations. Rapid development and availability of alternative fuels and vehicles, increased efficiency in new cars and trucks (light and heavy duty), and super clean fuels are the most direct approach to reducing GHG emissions from motor vehicles (emission performance standards and fuel or carbon performance standards)." Caltrans asserts that the state must maintain a consistent GHG reduction policy across all agencies to create a coordinated climate change program.

In the Climate Change Action Program, Caltrans recognizes the importance of regional planning in GHG emissions and notes that SACOG's Blueprint plan "would result in lowering 246,000 gallons of fuel each day."

c. Local Regulations

County and City General Plans

Many of SACOG's member agencies have general plans that do not specifically include energy elements or policies. However, several agencies have general plan elements and policies that specifically address energy use and conservation. Those energy conservation measures outlined in the various County and City General Plans of the MTP Plan Area contain goals, objectives, and policies aimed at reducing energy consumption. Proponents of specific projects in the MTP Plan Area would be required

to consult the applicable General Plans and design the projects consistent with the guidelines of those General Plans in which the projects are located.

Air Quality Management District

On September 6, 2007, the Sacramento Air Quality Management District issued a letter entitled "Addressing Climate Change in CEQA Documents." The purpose of the letter "is to provide interim recommendations for local agencies to use in analyzing and mitigating global warming impacts pending development of guidelines by the Office of Planning and Research as directed by SB 97." The Air District recognizes that local agencies "have the discretion to determine, based on a variety of factors, whether a particular impact is significant." In its recommendations, the Air District stated that environmental documents should include a discussion of GHG emissions during both construction and operation of the proposed project. In order to aid local agencies in their discussions of GHG emissions in environmental documents, the Air District also included a summary of current actions by courts and other agencies related to global warming and attached a list of proposed mitigation measures prepared by the Attorney General's office.

7. Geology Regulatory Setting

a. Federal Regulations

Clean Water Act 402/National Pollutant Discharge Elimination System

The Clean Water Act (CWA) is discussed in detail in the Hydrology and Water Quality chapter. However, because CWA 402 is directly relevant to excavation and grading, additional information is provided below. Amendments in 1987 to the CWA added Section 402p, which establishes a framework for regulating municipal and industrial stormwater discharges under the National Pollutant Discharge Elimination System (NPDES) program. The U.S. EPA has delegated to the State Water Resources Control Board (SWRCB) the authority for the NPDES program in California, which is implemented by the state's nine Regional Water Quality Control Boards (RWQCBs). Under the NPDES Phase II Rule, construction activity disturbing 1 acre or more must obtain coverage under the state's General Permit for Discharges of Storm Water Associated with Construction Activity (General Construction Permit). Proponents of specific projects under the MTP 2035 that would disturb one or more acres will be required to obtain a General Construction Permit, prepare a Notice of Intent and a Storm Water Pollution Prevention Plan (SWPPP), and implement and maintain BMPs to avoid adverse effects on water quality as a result of construction activities, including earthwork.

Earthquake Hazards Reduction Act

In October 1977, the U.S. Congress passed the Earthquake Hazards Reduction Act to reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards and reduction program. To accomplish this, the Act established the National Earthquake

Hazards Reduction Program (NEHRP). This program was significantly amended in November 1990 by the National Earthquake Hazards Reduction Program Act (NEHRPA) by refining the description of agency responsibilities, program goals and objectives.

Mining and Mineral Policy Act

The Mining and Mineral Act of 1970 declared that the Federal Government policy is to encourage private enterprise in the development of a sound and stable domestic mineral industry, domestic mineral deposits, minerals research, and methods for reclamation in the minerals industry.

Surface Mining and Reclamation Act (SMARA)

The intent of SMARA of 1975 is to promote production and conservation of mineral resources, minimize environmental effects of mining, and to assure that mined lands will be reclaimed to conditions suitable for alternative uses. An important part of the SMARA legislation requires the State Geologist to classify land according to the presence or absence of significant mineral deposits. Local jurisdictions are given the authority to permit or restrict mining operations, adhering to the SMARA legislation. Classification of an area using MRZs to designate lands that contain mineral deposits are designed to protect mineral deposits from encroaching urbanization and land uses that are incompatible with mining. The MRZ classifications reflect varying degrees of mineral significance, determined by available knowledge of the presence or absence of mineral deposits as well as the economic potential of the deposits.

Seismic Hazards Mapping Act, PRC Section 2690–2699

The Seismic Hazards Mapping Act (the Act) of 1990 (Public Resources Code, Chapter 7.8, Division 2) directs the California Department of Conservation, Division of Mines and Geology (now called CGS) to delineate Seismic Hazard Zones. The purpose of the Act is to reduce the threat to public health and safety and to minimize the loss of life and property by identifying and mitigating seismic hazards. These include areas identified that are subject to the effects of strong ground shaking, such as liquefaction, landslides, tsunamis, and seiches. Cities, counties, and state agencies are directed to use seismic hazard zone maps developed by CGS in their land-use planning and permitting processes. The Act requires that site-specific geotechnical investigations be performed prior to permitting most urban development projects within seismic hazard zones.

b. State Regulations

Alquist-Priolo Earthquake Fault Zoning Act

California's Alquist-Priolo Act (PRC 2621 et seq.), originally enacted in 1972 as the Alquist-Priolo Special Studies Zones Act and renamed in 1994, is intended to reduce the risk to life and property from surface fault rupture during earthquakes. The Alquist-Priolo Act prohibits the location of most types of structures intended for human occupancy across the traces of active faults and strictly regulates construction in the corridors along active faults (Earthquake Fault Zones). It also defines criteria for identifying active faults, giving legal weight to terms such as "active," and establishes a

process for reviewing building proposals in and adjacent to Earthquake Fault Zones. Under the Alquist-Priolo Act, faults are zoned, and construction along or across them is strictly regulated if they are "sufficiently active" and "well-defined." A fault is considered sufficiently active if one or more of its segments or strands shows evidence of surface displacement during Holocene time (defined for the purposes of the act as within the last 11,000 years). A fault is considered well-defined if its trace can be clearly identified by a trained geologist at the ground surface or in the shallow subsurface, using standard professional techniques, criteria, and judgment.

Seismic Hazards Mapping Act

Like the Alquist-Priolo Act, the Seismic Hazards Mapping Act of 1990 (PRC 2690–2699.6) is intended to reduce damage resulting from earthquakes. While the Alquist-Priolo Act addresses surface fault rupture, the Seismic Hazards Mapping Act addresses other earthquake-related hazards, including strong ground shaking, liquefaction, and seismically induced landslides. Its provisions are similar in concept to those of the Alquist-Priolo Act: The state is charged with identifying and mapping areas at risk of strong ground shaking, liquefaction, landslides, and other corollary hazards, and cities and counties are required to regulate development within mapped Seismic Hazard Zones. At the present time, the State has mapped Alameda, Los Angeles, Orange, San Francisco, and Ventura counties.

California Building Standards Code

California's minimum standards for structural design and construction are given in the California Building Standards Code (CBSC) (CCR Title 24). The CBSC is based on the UBC (International Code Council 1997), which is used widely throughout United States (generally adopted on a state-by-state or district-by-district basis) and has been modified for California conditions with numerous, more detailed or more stringent regulations. The CBSC provides standards for various aspects of construction, including (i.e., not limited to) excavation, grading, and earthwork construction; fills and embankments; expansive soils; foundation investigations; and liquefaction potential and soil strength loss. In accordance with California law, proponents of specific projects would be required to comply with all provisions of the CBSC for certain aspects of design and construction.

California Surface Mining and Reclamation Act (SMARA)

SMARA was enacted by the State Legislature in 1975 to regulate activities related to mineral resources extraction. The act requires the prevention of adverse environmental effects caused by mining, the reclamation of mined lands for alternative land uses and the elimination of public health and safety hazards from the effects of mining activities. At the same time, SMARA encourages both the conservation and production of extractive mineral resources, requiring the State Geologist to identify and attach levels of significance to the state's varied extractive resource deposits. Under SMARA, the mining industry in California must adequately plan for the reclamation of mined sites for beneficial uses and provide financial assurances to guarantee that the approved reclamation will actually be implemented. The requirements of SMARA must be

implemented by the local lead agency with permitting responsibility for the proposed mining project.

Caltrans Seismic Design Criteria

The California Department of Transportation (Caltrans) has Seismic Design Criteria (SDC), which is an encyclopedia of new and currently practiced seismic design and analysis methodologies for the design of new bridges in California. The SDC adopts a performance-based approach specifying minimum levels of structural system performance, component performance, analysis, and design practices for ordinary standard bridges. The SDC has been developed with input from the Caltrans Offices of Structure Design, Earthquake Engineering and Design Support, and Materials and Foundations. Memo20-1 outlines the bridge category and classification, seismic performance criteria, seismic design philosophy and approach, seismic demands and capacities on structural components and seismic design practices that collectively make up Caltrans' seismic design methodology.

California Division of Oil, Gas, and Geothermal Resources, PRC Section 3106.

Public Resources Code Section 3106 mandates the supervision of drilling, operation, maintenance, and abandonment of oil wells for the purpose of preventing: damage to life, health, property, and natural resources; damage to underground and surface waters suitable for irrigation or domestic use; loss of oil, gas, or reservoir energy; and damage to oil and gas deposits by infiltrating water and other causes. In addition, the California Division of Oil, Gas, and Geothermal Resources (DOGGR) regulates drilling, production, injection, and gas storage operations in accordance with California Code of Regulations (CCR) Title 14, Chapter 4, Subchapter 1.

Landslide Hazard Identification Program, PRC Section 2687(a)

The Landslide Hazard Identification Program requires the State Geologist to prepare maps of landslide hazards within urbanizing areas. According to Public Resources Code Section 2687(a), public agencies are encouraged to use these maps for land use planning and for decisions regarding building, grading, and development permits.

c. Local Regulations

Geotechnical Investigations

Local jurisdictions typically regulate construction activities through a process that may require the preparation of a site-specific geotechnical investigation. The purpose of a site-specific geotechnical investigation is to provide a geologic basis for the development of appropriate construction design. Geotechnical investigations typically assess bedrock and Quaternary geology, geologic structure, soils, and the previous history of excavation and fill placement. Proponents of specific projects that require design of earthworks and foundations for proposed structures will need to prepare geotechnical investigations on the physical properties of soil and rock at the site prior to project design.

Local Grading and Erosion Control Ordinances

Many counties and cities have grading and erosion control ordinances. These ordinances are intended to control erosion and sedimentation caused by construction activities. A grading permit is typically required for construction-related projects. As part of the permit, project applicants usually must submit a grading and erosion control plan, vicinity and site maps, and other supplemental information. Standard conditions in the grading permit include a description of BMPs similar to those contained in a SWPPP.

County and City General Plans

The seismic elements of the various County and City General Plans contain goals, objectives, and policies aimed at reducing the seismic risk to people and property. Proponents of specific projects would be required to consult the applicable general plans and design the projects consistent with the applicable guidelines of the jurisdictions in which the projects are located.

8. Hydrology Regulatory Setting

a. Federal Regulations

Clean Water Act (CWA)

Enacted by Congress in 1972 as the first comprehensive national clean water legislation to protect our nation's waters, the Clean Water Act (CWA) mandates cooperative effort by federal, state, and local governments to implement its pollution control measures. The law is intended to improve the quality of the nation's waters using a framework of standards, technical tools, and financial assistance to address pollution and poor water quality. The CWA is the primary federal law that protects the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands. It operates on the principle that all discharges into the nation's waters are unlawful unless specifically authorized by a permit; permit review is the CWA's primary regulatory tool. The CWA requires that National Pollutant Discharge Elimination System (NPDES) permits be obtained for any discharges to surface waters by a point source and for municipal and industrial stormwater discharges. The following paragraphs provide additional details on NPDES permits and specific sections of the CWA that could apply to specific activities, related to subsequent measure development and projects within the state, including construction and effluent discharge.

Impaired Water Bodies

Under CWA Section 303(d) and California's Porter-Cologne Water Quality Control Act of 1969 (Porter- Cologne Act) (see below), California is required to establish beneficial uses of state waters and to adopt water quality standards to protect those beneficial uses. Section 303(d) establishes the total maximum daily load (TMDL) process to assist in guiding the application of state water quality standards, requiring the states to identify streams whose water quality is "impaired" (affected by the presence of pollutants or contaminants) and to establish the TMDL, or the maximum quantity of a particular contaminant that a water body can assimilate without experiencing adverse

effects. CWA Section 303(d) also requires the state to identify water bodies that do not meet water quality standards and thus exhibit impaired beneficial uses. As such, every two years the State Water Board releases a list of impaired waters and proposes a completion date for a TMDL to address the identified impairment. Some of the of the proposed measures' projects would be located within areas that discharge to impaired waters, as identified in the *2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments* (State Water Board 2006).

Water Quality Certification

Under CWA Section 401, applicants for a federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification from the state in which the discharge would originate, or, if appropriate, from the interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate. Therefore, all projects that have a federal component and may affect the quality of the state's waters (including projects that require federal agency approval, such as issuance of a Section 404 permit) must also comply with CWA Section 401. Section 401 certification or waiver is under the jurisdiction of the RWQCB.

Surface Water Discharges

CWA Section 402 regulates discharges to surface waters through the NPDES program, administered by the U.S. EPA. In California, the State Water Board is authorized by the U.S. EPA to oversee the NPDES program through RWQCBs (see related discussion under "Porter-Cologne Water Quality Control Act" below). The NPDES program provides for both general permits (those that cover a number of similar or related activities) and individual permits.

Construction Activities

As of February 2003, the U.S. EPA requires that a project proponent apply for an NPDES stormwater permit and develop a Storm Water Pollution Prevention Plan (SWPPP) for ground-disturbing activities that would affect 1 acre or more. The RWQCB administers the NPDES stormwater permitting program for construction activities in the Central Valley Region. For the purposes of the NPDES, construction activities are defined as clearing, excavating, grading, or other land-disturbing activities. The RWQCB authorizes stormwater discharges to waters of the United States under the State Water Board's General Construction Permit. For qualifying projects, the project applicant must submit to the RWQCB a Notice of Intent (NOI) to be covered by the General Construction Permit before the beginning of construction. The General Construction Permit requires the preparation and implementation of a SWPPP, which must be completed before construction begins.

Dewatering Activities

While small amounts of construction-related dewatering are covered under the General Construction Permit, the RWQCB has also adopted a General Order for Dewatering and Other Low Threat Discharges to Surface Waters (General Dewatering Permit). This permit applies to various categories of dewatering activities and would likely apply to the

project area, if construction of specific projects required dewatering in greater quantities than that allowed by the General Construction Permit and discharged the effluent to surface waters. The General Dewatering Permit contains waste discharge limitations and prohibitions similar to those in the General Construction Permit.

Municipal Activities

The Clean Water Act Section 402 mandates permits for municipal stormwater discharges, which are regulated under the NPDES General Permit for Municipal Separate Storm Sewer Systems (MS4) (MS4 Permit). Several of the cities and counties issue their own NPDES municipal stormwater permits for the regulations of stormwater discharges. These permits require that controls are implemented to reduce the discharge of pollutants in stormwater discharges to the maximum extent possible, including management practices, control techniques, system design and engineering methods, and other measures as appropriate. As part of permit compliance, these permit holders have created Stormwater Management Plans for their respective locations. These plans outline the requirements for municipal operations, industrial and commercial businesses, construction sites, and planning and land development. These requirements may include multiple measures to control pollutants in stormwater discharge. During implementation of specific projects, applicants will be required to follow the guidance contained in the Stormwater Management Plans as defined by the permit holder in that location.

Fill Placement in Waters and Wetlands

CWA Section 404 regulates the discharge of dredged and fill materials into “waters of the United States,” which include oceans, bays, rivers, streams, lakes, ponds, and wetlands. Project applicants must obtain a permit from the USACE) for all discharges of dredged or fill material into waters of the United States, including wetlands, before proceeding with a proposed activity. Before any actions that may adversely affect surface waters are carried out, a delineation of jurisdictional waters of the United States must be completed, following USACE protocols, to determine whether the permit study area encompasses wetlands or other waters of the United States that qualify for CWA protection. These include any or all of the following.

- Areas within the ordinary high water mark of a stream, including non-perennial streams with a defined bed and bank, and any stream channel that conveys natural runoff, even if it has been realigned.

- Seasonal and perennial wetlands, including coastal wetlands.

Wetlands are defined for regulatory purposes as areas “inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (33 CFR 328.3, 40 CFR 230.3). Refer to the Biological Resources chapter for more information on wetlands regulation.

Federal Flood Insurance Program

Alarmed by increasing costs of disaster relief, Congress passed the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. The intent of these acts was to reduce the need for large, publicly funded flood control structures and disaster relief by restricting development on floodplains. FEMA administers the National Flood Insurance Program (NFIP) to provide subsidized flood insurance to communities that comply with FEMA regulations that limit development in floodplains. FEMA issues flood insurance rate maps (FIRMs) for communities participating in the NFIP. These maps delineate flood hazard zones in the community. FEMA also administers levee standards. Requirements for levee construction include embankment protection, embankment and foundation stability, settlement, and maintenance plans and criteria.

Executive Order 11988

Executive Order 11988 (Floodplain Management) addresses floodplain issues related to public safety, conservation, and economics. It generally requires federal agencies constructing, permitting, or funding to avoid incompatible floodplain development, be consistent with the standards and criteria of the NFIP, and restore and preserve natural and beneficial floodplain values. This order would apply to any proposed projects, if outfall construction related to the CWA § 404 permit falls under any of the bulleted categories list above, or if federal funds are used for construction.

National Toxics Rule and California Toxics Rule

Applicable receiving water quality criteria promulgated by the U.S. EPA for priority air toxics consisting generally of trace metals, synthetic organic compounds, and pesticides.

b. State Regulations

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (California Water Code Section 13000 et seq.), passed in 1969, articulates with the federal CWA (see “Clean Water Act” above) and provides the basis for water quality regulation within California. The act requires a Report of Waste Discharge for any discharge of waste (liquid, solid, or otherwise) to land or surface waters that may impair a beneficial use of surface water or groundwater of the State. Waste discharge requirements resulting from the report are issued by the RWQCB. In practice, these requirements are typically integrated with the NPDES permitting process. The Porter-Cologne Water Quality Control Act established the State Water Board and divided the State into nine regions, each overseen by a Regional Water Quality Control Board (RWQCB). The State Water Board is the primary state agency responsible for protecting the quality of the State’s surface and groundwater supplies, but much of its daily implementation authority is delegated to the nine RWQCBs, which are responsible for implementing CWA Sections 401, 402, and 303(d). In general, the State Water Board manages both water rights and statewide regulation of water quality, while the RWQCBs focus exclusively on water quality within their regions. The Central Valley RWQCB is responsible for regulating discharges.

Beneficial Uses and Water Quality Objectives

The RWQCB is responsible for the protection of beneficial uses of water resources within the Central Valley Region. Beneficial uses are those desired resources, services, and qualities of the aquatic system that are supported by achieving and protecting high water quality. The RWQCB uses planning, permitting, and enforcement authorities to meet this responsibility and prepares Basin Plans that identify plans, policies, and provisions for water quality management. Beneficial uses are described in the Basin Plan and are designated for major surface waters and their tributaries, as well as groundwater. In addition to the identification of beneficial uses, the Basin Plan contains water quality objectives that are intended to protect the beneficial uses of the basins. For example. the Central Valley RWQCB has region-wide and water body/beneficial use–specific water quality objectives. The RWQCB has set water quality objectives for all surface waters in its region for the following substances and parameters: NH_3, bacteria, iostimulatory substances, chemical constituents, color, dissolved oxygen, floating material, oil and grease, pH, pesticides, radioactivity, salinity, sediment, settleable material, suspended material, tastes and odors, temperature, toxicity, and turbidity. Specific objectives for concentrations of chemical constituents are applied to bodies of water based on their designated beneficial uses (CVRWQCB 2006). Water quality objectives applicable to all groundwaters in the region have been set for bacteria, chemical constituents, radioactivity, tastes and odors, and toxicity (CVRWQCB 2006).

Basin plans are primarily implemented by using the NPDES permitting system to regulate waste discharges so that water quality objectives are met (see discussion of the NPDES permits in the “Clean Water Act” section above). Basin plans are updated every 3 years, and provide the technical basis for determining waste discharge requirements and taking enforcement actions**.**

State Water Board – Regulations to Protect the Delta

California Fish and Game Code Section 1600 et seq. (Lake- or Streambed Alteration Agreement Program)

Under Sections 1600–1616 of the California Fish and Game Code, DFG regulates projects that affect the flow, channel, or banks of rivers, streams, and lakes. Projects in the MTP 2035 that involve construction near or across a river, stream, or lake would be required to comply with these regulations. Section 1602 requires public agencies and private individuals respectively to notify and enter into a streambed or lakebed alteration agreement with DFG before beginning construction of a project that will: divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake; or use materials from a streambed. Section 1602 contains additional prohibitions against the disposal or deposition of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into any river, stream, or lake.

Sections 1601–1607 may apply to any work undertaken within the 100-year floodplain of any body of water or its tributaries, including intermittent stream channels. In general, however, it is construed as applying to work within the active floodplain and/or

associated riparian habitat of a wash, stream, or lake that provides benefit to fish and wildlife. Sections 1601–1607 typically do not apply to drainages lack a defined bed and banks, such as swales, or to very small bodies of water and wetlands such as vernal pools.

c. Local Regulations

The Delta Protection Commission

The Delta Protection Act of 1992 established the Delta Protection Commission (Commission), which is comprised of 19 members of diverse composition. Representatives from SACOG and Sacramento County serve as members of the Commission. The Commission's purpose is to develop a long-term resource management plan for the Delta Primary Zone. As stated in the Act, the goals of this regional plan are to "protect, maintain and, where possible, enhance and restore the overall quality of the delta environment, including, but not limited to, agriculture, wildlife habitat, and recreational activities." The Act acknowledges the significance and irreplaceable natural resources of the Delta. Agricultural lands in the Delta are of value as open space and habitat for waterfowl using the Pacific Flyway. A goal of the regional plan is to protect agricultural land within the Primary Zone from the intrusion of nonagricultural uses. All local general plans for areas within the Primary Zone are required to be consistent with the regional plan. The Secondary Zone consists of areas within the statutory Delta (as defined in § 12220 of the California Water Code) but not part of the Primary Zone. Local general plans for land use in the Secondary Zone are not required to conform to a regional plan. However, the Commission may review and comment on projects in the Secondary Zone, including some of the proposed transportation projects in southern Sacramento County.

Water Agencies

These agencies enter into contracts or agreements with the federal and state governments to protect the water supply and to ensure the lands within the agency have a dependable supply of suitable quality water to meet present and future needs.

County General Plan

The County General Plans, specifically Sacramento, have several policies and implementation measures to achieve their goal to "minimize the loss of life, injury, and property damage due to flooding hazards" within the Safety Element of the General Plan (County of Sacramento 1993). In addition, there are several policies and implementation measures related to water quality protection and wastewater runoff in the Public Facilities Element of the General Plan. Project proponents must comply with these policies and regulations related to flooding issues in the Safety Element and water quality issues in the appropriate Element of the General Plan.

Environmental Health

The Regional Water Boards generally delegate permit authority to County health departments to regulate the construction and operation/maintenance of on-site sewage disposal systems (e.g., septic systems and leachfields, cesspools).

Drainage, Grading, and Erosion Control Ordinances

Counties regulate building activity under the federal Uniform Building Code, local ordinances, and related development design review, approval, and permitting. Local ordinances are common for water quality protection addressing drainage, stormwater management, land grading, and erosion and sedimentation control.

Floodplain Management

General Plans guide County land use decisions, and require the identification of water resource protection goals, objectives, and policies. Floodplain management is addressed through ordinances, land use planning, and development design review and approval. Local actions may be coordinated with FEMA for the National Flood Insurance Program. Typical provisions address floodplain use restrictions, flood protection requirement, allowable alteration of floodplains and stream channels, control of fill and grading activities in floodplains, and prevention of flood diversions where flows would increase flood hazards in other areas.

9. Land Use Regulatory Setting

a. Federal Regulations

Federal Land Policy Management Act

The Federal Land Policy Management Act of 1976 (FLPMA) is the principal law governing how the BLM manages public lands. FLPMA requires the BLM to manage public land resources for multiple use and sustained yield for both present and future generations. Under FLPMA, the BLM is authorized to grant right-of-ways (ROWs) for generation, transmission, and distribution of electrical energy. Although local agencies do not have jurisdiction over the federal lands managed by the BLM, under FLPMA and the BLM regulations at 43 CFR Part 1600, the BLM must coordinate its planning efforts with state and local planning initiatives.

U.S. Bureau of Land Management Resource Management Plans

Established by FLPMA, Resource Management Plans (RMPs) are designed to protect present and future land uses and to identify management practices needed to achieve desired conditions within the management area covered by the RMP. Management direction is set forth in the RMPs in the form of goals, objectives, standards, and guidelines. These, in turn, direct management actions, activities, and uses that affect land management, and water, recreation, visual, natural, and cultural resources. RMPs anticipated to be potentially implicated with implementation of the RES include the following:

California Desert Conservation Area RMP

Section 601 of FLPMA established the California Desert Conservation Area (CDCA) in southeast California. Roughly 12 million acres of the 25 million-acre CDCA are public lands managed by the BLM. Management practices in this area are defined in the CDCA Plan issued in 1980 and amended in 1999. The CDCA Plan is a comprehensive, long-range, plan with goals and specific actions for the management, use, development,

and protection of the resources and public lands within the CDCA, and it is based on the concepts of multiple use, sustained yield, and maintenance of environmental quality. The plan's goals and actions for each resource are established in its twelve elements. Each of the plan elements provides both a desert-wide perspective of the planning decisions for one major resource or issue of public concern as well as more specific interpretation of multiple-use class guidelines for a given resource and its associated activities.

California Coastal National Monument RMP

The mission of the California Coastal National Monument (CCNM) RMP is to protect and foster an appreciation for and stewardship of unique coastal resources associated with the California National Monument. The CCNM, covers more than 20,000 rocks and islands along the scenic 1,100-mile California coast. The plan does not include major islands such as the Channel Islands, the Farallon Islands, or the islands in San Francisco Bay. The plan contains broad direction for the protection of the geologic formations and habitats for seabirds, sea lions, seals, and plant life. The plan's strategy focuses on the coordination of the man actions already in place to protect California's coastal resources and emphasizes multi-agency cooperation.

Santa Rosa/San Jacinto Mountains National Monument RMP

The Santa Rosa and San Jacinto Mountains National Monument was designated by Congress in 2000. The monument comprises 150,000 acres of public lands in Riverside County. The BLM co-manages this desert setting with the U.S. Forest Service and partners with other state agencies, local governments, and Native American tribes, including the Agua Caliente Band of Cahuilla Indians.

South Coast RMP

The South Coast Resource Management Plan, completed in 1994, covers over 130,000 acres of public land and 167,000 acres of federal mineral ownership where the surface is privately owned (referred to as the BLM split estate land). The BLM public lands in the South Coast planning area are scattered over a five-county area in over 300 separate parcels. Most of the BLM land base in the planning area is in western San Diego and western Riverside counties, with the remainder in southwestern San Bernardino, Los Angeles, and Orange counties.

The BLM is currently developing a revision to the South Coast RMP.

Eastern San Diego County RMP

The Eastern San Diego County RMP covers nearly 100,000 acres of public lands in California sitting between the California Peninsular Ranges and the Colorado Desert ecosystem. Most of the higher land to the west is a part of the Cleveland National Forest, while the low desert country to the east is included in the Anza–Borrego Desert State Park. Cuyamaca Rancho State Park and a number of small Indian reservations are interspersed with national forest lands. Riverside County and the Mexican border mark the northern and southern boundaries of the Planning Area, while Imperial County borders it to the east and western San Diego County to the west.

Areas of Critical Environmental Concern

FLPMA defines an Area of Critical Environmental Concern (ACEC) as an area within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards. The BLM identifies, evaluates, and designates ACECs through its resource management planning process. Allowable management practices and uses, mitigation, and use limitations, if any, are described in the planning document and the concurrent or subsequent ACEC Management Plan. ACECs are considered land use authorization avoidance areas because they are known to contain resource values that could result in denial of applications for land uses that cannot be designed to be compatible with management objectives and prescriptions for the ACEC.

National Landscape Conservation System

Created in 2000, the BLM's National Landscape Conservation System (NLCS) encompasses 27 million acres and is composed of 880 units that include national monuments, national conservation areas, wilderness and wilderness study areas, wild and scenic rivers, national scenic and historic trails, and conservation lands, including lands in the California Dessert. In March 2009, Congress passed the Omnibus Public Lands Management Act, providing a statutory basis for the NLCS. The mission of the NLCS is to conserve, protect, and restore nationally significant landscapes recognized for their outstanding cultural, ecological, and scientific values.

National Forest Management Act of 1976

The National Forest Management Act (NFMA) is the primary statute governing the administration of national forests. The act requires the Secretary of Agriculture to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the National Forest System. National Forest Plan's potentially implicated by the proposed RES include the San Bernardino, Angeles, Cleveland and the Los Padres National Forest Management Plans. Goal 4 of the U.S. Forest Service's National Strategic Plan for the National Forests states that the nation's forests and grasslands play a significant role in meeting America's need for producing and transmitting energy. Unless otherwise restricted, National Forest Service lands are available for energy exploration, development, and infrastructure (e.g., well sites, pipelines, and transmission lines). However, the emphasis on non-recreational special uses, such as utility corridors, is to authorize the special uses only when they cannot be reasonably accommodated on non-National Forest Service lands.

California Desert Protection Act of 1994

Congress enacted the California Desert Protection Act (CDPA) in 1994 (Public Law 103-433) to establish desert wilderness areas for protection including the Chuckwalla Mountains Wilderness, the Little Chuckwalla Mountains Wilderness, the Palen/McCoy Wilderness, and the Palo Verde Mountains Wilderness. In addition, this act established Death Valley National Park, Joshua Tree National Park and the Mojave National

Preserve. The act established administration of wilderness lands and addresses land use compatibility issues such as buffers and utility ROWs.

Wild and Scenic Rivers Act

This act established a National Wild and Scenic Rivers System for the protection of rivers with important scenic, recreational, fish and wildlife, and other values. The act contains procedures and limitations for control of lands in federally administered components of the System and for disposition of lands and minerals under federal ownership.

Comprehensive Conservation Plans for National Wildlife Refuges

USFWS is directed to develop comprehensive conservation plans (CCP) to guide the management and resource use for each refuge of the National Wildlife Refuge System under requirements of the National Wildlife Refuge Improvement Act of 1997. Refuge planning policy also directs the process and development of CCPs. A CCP describes desired future conditions and long-range guidance necessary to meet refuge purposes. It also guides management decisions and sets forth strategies for achieving refuge goals and objectives within a 15-year time frame.

National Trails System Act

The National Trails System Act is intended to promote the preservation of, public access to, travel within, and the enjoyment and appreciation of the open air, outdoor areas, and historic resources through the establishment of a national trail system. The act created a series of trails that are administered by a federal agency (BLM, USFS, or NPS).

Farmland Protection Policy Act

The Farmland Protection Policy Act (FPPA) directs Federal agencies to consider the effects of Federal programs or activities on farmland, and ensure that such programs, to the extent practicable, are compatible with state, local, and private farmland protection programs and policies. The rating process established under the FPPA was developed to help assess options for land use on an evaluation of productivity weighed against commitment to urban development.

Federal Aviation Administration Regulations

Federal Aviation Administration (FAA) regulations address potential aircraft obstruction for structures taller than 200 feet or within 20,000 feet of an airport. Specifically, Federal Regulation Title 14, Part 77, established standards and notification requirements for objects that have the potential to affect navigable airspace. The Part 77 standards are intended to: (1) evaluate the effect of the construction or alteration of structures on airport operating procedures; (2) determine if there is a potential hazard to air navigation; and (3) identify measures to enhance safety. Specifically, the FAA requires notification through the filing of FAA Form 7460, Notice of Proposed Construction or Alteration, if a structure is over 200 feet in height or closer than 20,000 feet to an existing airport or airport under construction.

b. State Regulations

Natural Communities Conservation Planning Act

The California Fish and Game Code (sections 2800–2835) set forth policies on the conservation, protection, restoration, and enhancement of the California's natural resources and ecosystems. The intent of the legislation is to provide for conservation planning as an officially recognized policy that can be used as a tool to eliminate conflicts between the protection of the State's natural resources and the need for growth and development. In addition, the legislation promotes conservation planning as a means of coordination and cooperation among private interests, agencies, and landowners, and as a mechanism for multispecies and multi-habitat management and conservation.

California Department of Fish and Game Wildlife Areas and Ecological Reserves

Uses of these DFG-managed areas are restricted to those "compatible with wildlife values." Energy development is not allowed on these lands (geothermal drilled from outside the reserves might be an exception). Some reserves have existing easements for transmission which may allow upgrades with mitigation (additional lands purchased). DFG may also require undergrounding transmission lines in some circumstances.

State Park Units

DPR may acquire title or any interest in real property, "which the department deems necessary or proper for the extension, improvement, or development of the state park system" (Public Resources Code, § 5006). Prior to classifying a unit, the department must prepare an "inventory of the unit's scenic, natural, and cultural features, including, but not limited to, ecological, archaeological, historical, and geological features" (Public Resources Code, § 5002.1). This inventory is then considered by the DPR in classifying a unit. There are eight classification categories: State parks, State recreation units, Historical units, State seashores, State reserves, State wildernesses, Natural preserves, and Cultural preserves (§5019.53 – 5019.74). The last three units are subunits of the first five. Management and improvements on State parks must be made in a manner that protects the native environment to the "extent compatible with the primary purpose for which the park was established" (PRC §5019.53).

State Conservancies

The seven California Conservancies (Tahoe, Coastal, Santa Monica Mountains, San Gabriel, and Lower Los Angeles Rivers and Mountains, Coachella Valley and Mountains, San Joaquin River, and Baldwin Hills) were legislatively created to protect and preserve distinct regions of the state. They are empowered to acquire land to preserve and restore habitat and ecosystems, and provide recreational opportunities in these regions.

The state conservancies are given broad powers to conserve land and natural resources in defined geographical regions of statewide significance. Most conservancies have a direct mandate to provide recreation and education activities.

Thus, they are engaged in conservation for human use, though they often also seek to conserve natural systems as well.

Wild and Scenic Rivers Act

This act establishes a Wild and Scenic Rivers System for the protection of rivers with important scenic, recreational, fish and wildlife, and other values. It was created in 1972 by the Legislature in an effort to balance the traditional water and power development on rivers with a preservation of some free-flowing segments for their recreation and wildlife values. In the state, 1,900 miles of river are under Wild and Scenic protection. Pursuant the California Wild and Scenic Rivers Act, no dam or reservoir shall be constructed on any river unless the Secretary determines that the facility is needed to supply domestic water and that it will not adversely affect the free-flowing condition of the river (Public Resources Code, § 5093.55).

State Planning and Zoning Law

California Government Code section 65300 et seq. establishes the obligation of cities and counties to adopt and implement general plans. The general plan is a comprehensive, long-term, and general document that describes plans for the physical development of the city or county. The general plan addresses a broad range of topics, including, at a minimum, land use, circulation, housing, conservation, open space, noise, and safety. In addressing these topics, the general plan identifies the goals, objectives, policies, principles, standards, and plan proposals that support the city or county's vision for the area. The general plan is also a long-range document that typically addresses the physical character of an area over a 20-year period. Although the general plan serves as a blueprint for future development and identifies the overall vision for the planning area, it remains general enough to allow for flexibility in the approach taken to achieve the plan's goals. General Plans anticipated as likely to be implicated by the RES are discussed under "Local" regulations, below.

The State Zoning Law (Government Code section 65800 et seq.) establishes that zoning ordinances, which are laws that define allowable land uses within a specific district, must be consistent with the general plan and any applicable specific plan.

Senate Bill 375

California SB 375, signed into law on October 1, 2008, is intended to enhance CARB's ability to reach AB 32 goals by directing CARB to develop regional GHG emissions reduction targets to be achieved within the automobile and light truck sectors for 2020 and 2035. CARB will work with California's 18 metropolitan planning organizations (MPOs) to align their regional transportation, housing, and land use plans and prepare a "Sustainable Communities Strategy" (SCS) to reduce the number of vehicle miles traveled in their respective regions and demonstrate the region's ability to attain its GHG reduction targets.

Additionally, SB 375 provides incentives for creating attractive, walkable, and sustainable communities and revitalizing existing communities. The bill exempts home builders from certain CEQA requirements if they build projects consistent with the new

sustainable community strategies. It also encourages the development of more alternative transportation options, to promote healthy lifestyles and reduce traffic congestion.

Farmland Conservation

The Department of Conservation's Division of Land Resource Protection administers two important incentive programs for the preservation of agricultural land. The California Land Conservation Act, also known as the Williamson Act (Govt. Code, § 51200) was passed in 1965 to preserve, through tax incentives, farmland pressured by spiraling land valuation and tax increases associated with suburban growth. Farmland enrolled in the program is assessed at farmland value, as opposed to the Proposition 13 valuation; and, through the Open Space Subvention Act, counties are substantially reimbursed for lost property tax revenue. Approximately 16 million acres of farmland (about 50 percent of the State's total farmland) are enrolled in the program. Amendments to the Budget Act of 2009 reduced Williamson Act Subvention payments budget to $1,000, essentially suspending the subvention payments to the counties.

The Farmland Security Zone is additional agricultural land conservation legislation that allows local governments and landowners to rescind a Williamson Act contract and simultaneously place the farmland under a Farmland Security Zone contract for an initial term of at least 20 years. A Farmland Security Zone contact offers landowners greater property tax reduction than the Williamson Act by valuing enrolled real property at 65 percent of its Williamson Act valuation, or its Proposition 13 valuation, whichever is lower.

California Government Code Section 51238 states that unless otherwise decided by a local board or council, the erection, construction, alteration, or maintenance of electric and communication facilities, as well as other facilities, are determined to be compatible uses within any agricultural preserve. Also Section 51238 states the board of supervisors may impose conditions on lands or land uses to be placed within preserves to permit and encourage compatible uses in conformity with Section 51238.1.

Further, California Government Code Section 51238.1 allows a board or council to allow as compatible a use that without conditions or mitigations would otherwise be considered incompatible. However, this may occur only if the use meets the following conditions:

The use will not significantly compromise the long-term productive agricultural capability of the subject contracted parcel or parcels or on other contracted lands in agricultural preserves.

The use will not significantly displace or impair current or reasonably foreseeable agricultural operations on the subject contracted parcel or parcels or on other contracted lands in agricultural preserves. Uses that significantly displace agricultural operations on the subject contracted parcel or parcels may be deemed compatible if they relate directly to the production of commercial agricultural products on the subject

contracted parcel or parcels or neighboring lands, including activities such as harvesting, processing, or shipping.

The use will not result in the significant removal of adjacent contracted land from agricultural or open-space use.

The California Farmland Conservancy Program (CFCP) was created in 1996 (Public Resources Code, §10200) and provides grant funding for agricultural conservation easements. Although the easements are always written to reflect the benefits of multiple resource values, there is a provision in the CFCP statute that prevents easements funded under the program from restricting husbandry practices. This provision could prevent restricting those practices to benefit other natural resources.

The Department of Conservation also administers the Farmland Mapping and Monitoring Program (FMMP) (Gov. Code §65570, PRC §612). The FMMP was established in 1982 to assess the location, quality, and quantity of agricultural lands and conversion of these lands over time. Agricultural designations used by the DOC include the following:

- **Prime Farmland:** Farmland with the best combination of physical and chemical features able to sustain long-term agricultural production. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.

- **Farmland of Statewide Importance:** Farmland similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.

- **Unique Farmland:** Farmland of lesser quality soils used for the production of the State's leading agricultural crops. This land is usually irrigated, but may include non-irrigated orchards or vineyards as found in some climatic zones in California. Land must have been cropped at some time during the four years prior to the mapping date.

- **Farmland of Local Importance:** Land of importance to the local agricultural economy as determined by each county's board of supervisors and a local advisory committee.

- **Grazing Land:** Land on which the existing vegetation is suited to the grazing of livestock. This category was developed in cooperation with the California Cattlemen's Association, University of California Cooperative Extension, and other groups interested in the extent of grazing activities. The minimum mapping unit for Grazing Land is 40 acres.

- **Urban and Built-Up Land:** Land occupied by structures with a building density of at least 1 unit to 1.5 acres, or approximately 6 structures to a 10-acre parcel. This land is used for residential, industrial, commercial, institutional, public administrative purposes, railroad and other transportation yards, cemeteries, airports, golf courses, sanitary landfills, sewage treatment, water control structures, and other developed purposes.

- **Other Land:** Land not included in any other mapping category. Common examples include low density rural developments; brush, timber, wetland, and riparian areas not suitable for livestock grazing; confined livestock, poultry or aquaculture facilities; strip mines and borrow pits; and water bodies smaller than 40 acres. Vacant and nonagricultural land surrounded on all sides by urban development and greater than 40 acres is mapped as Other Land.

California Coastal Act of 1976

The California Coastal Act contains provisions to protect agricultural productivity in the coastal zone. The act has specific guidance measures to avoid the conversion of prime agricultural land.

The maximum amount of prime agricultural land shall be maintained in agricultural production to assure the protection of the area's agricultural economy, and conflicts shall be minimized between agricultural and urban land uses through all of the following:

> "…(e) By assuring that public service and facility expansions and nonagricultural development do not impair agricultural viability, either through increased assessment costs or degraded air and water quality (§30241 California Public Resources Code)."

Further, the Coastal Act calls for the protection of the long-term productivity of soils and timberlands (§30243 California Public Resources Code).

Airport Land Use Compatibility Planning

The State Aeronautics Act (Pub. Utilities Code section 21001 et seq.) establishes statewide requirements for the airport land use compatibility planning and requires nearly every county to create an Airport Land Use Commission (ALUC) or other alternative).

The California Department of Transportation (Caltrans) Airport Land Use Planning Handbook (CalTrans 2002) establishes guidance on land use planning in the vicinity of airports in California. The Handbook also outlines the legal authority (and limitations thereof) possessed by an ALUC when establishing noise and safety corridors around airports that potentially restrict land use development. The intent of the Handbook is to make recommendations for an ALUC for establishing land use development policies based upon FAA regulations, rather than specifying precise statutes or means of interpreting FAA regulations.

The purpose of an ALUC is to establish policies which intend to make land use development around airports compatible with airport-related noise and safety corridors. As applicable, these policies must follow established FAA regulations and other federal, state, and local statutes. However, the Caltrans Handbook provides guidance on the scope of authority that an ALUC has to restrict land use development. Generally speaking, Caltrans guidance suggests that land use restrictions are legitimate when they prevent harm to the surrounding area rather than confer a benefit to the airport. Chapter 9 of the Caltrans Handbook provides guidance on establishing safety corridors ("safety compatibility zones") around airports which dictate the type and density of development permitted. The Caltrans corridors are delineated based upon runway length and types of aircraft typically flown at an airport, and are intended as a guide, rather than specific criteria to be followed by an ALUC (Caltrans, 2002).

The most direct regulation of land use and development is provided by city and county governments, but federal and state levels of government also participate in various ways in land use regulation and planning for the regional transportation needs. An overview of land use regulation is provided below.

U.S. Bureau of Land Management (BLM).

The BLM manages large rural land areas, including land that is environmentally sensitive. The BLM governs the uses that will be allowed on land that it manages, striving to balance environmental protection and conservation goals with other uses such as recreation and grazing. BLM manages lands in Yuba County and in the Placer and El Dorado County foothills.

U.S. Forest Service (USFS). The U.S. Forest Service (USFS) is responsible for the management of large areas of National Forest land. National forests are primarily managed for outdoor recreational uses and for resource preservation by the USFS.

Senate Bill 375 (Steinberg, Chapter 781, Statutes of 2008)

SB 375 requires ARB to develop regional GHG emissions reduction targets for passenger vehicles. ARB is to establish targets for 2020 and 2035 for each region covered by one of the State's 18 metropolitan planning organizations (MPOs).

Each of California's MPOs must prepare a "sustainable communities strategy (SCS)" that demonstrates how the region will meet its GHG reduction target through integrated land use, housing and transportation planning. Once adopted by the MPO, the SCS will be incorporated into that region's federally enforceable regional transportation plan (RTP). ARB is also required to review each final SCS to determine whether it would, if implemented, achieve the GHG emissions reduction target for its region. If the combination of measures in the SCS will not meet the region's target, the MPO must prepare a separate "alternative planning strategy (APS)" to meet the target. The APS is not a part of the RTP.

SB 375 also establishes incentives to encourage implementation of the SCS and APS. Developers can get relief from certain environmental review requirements under CEQA

if their new residential and mixed-use projects are consistent with a region's SCS (or APS) that meets the target (see Cal. Public Resources Code §§ 21155, 21155.1, 21155.2, 21159.28.).

Natural Community Conservation Planning Act (1991)

The Natural Community Conservation Planning (NCCP) program of DFG is an unprecedented effort by California, and numerous private and public partners, that takes a broad-based ecosystem approach to planning for the protection and perpetuation of biological diversity. An NCCP identifies and provides for the regional or areawide protection of plants, animals, and their habitats, while allowing compatible and appropriate economic activity.

The NCCP program is a cooperative effort to protect habitats and species. The program, which began in 1991 under the State's Natural Community Conservation Planning Act, is broader in its orientation and objectives than the California and Federal Endangered Species Acts. These laws are designed to identify and protect individual species that have already declined in number significantly.

The primary objective of the NCCP program is to conserve natural communities at the ecosystem level while accommodating compatible land use. The program seeks to anticipate and prevent the controversies and gridlock caused by species' listings by focusing on the long-term stability of wildlife and plant communities and including key interests in the process.

Local Agency Formation Commissions

The Cortese-K NO_x-Hertzberg Act of 2000 (Government Code Section 56000, et seq.), establishes the process through which local agency boundaries are established and revised. Each county must have a local agency formation commission (LAFCO), which is the agency that has the responsibility to create orderly local government boundaries, with the goal of encouraging "planned, well-ordered, efficient urban development patterns," the preservation of open-space lands, and the discouragement of urban cities, and one member of the public. Many LAFCOs also include one special district representative.

While LAFCOs have no land use power, their actions determine which local government will be responsible for planning new areas. LAFCOs address a wide range of boundary actions, including creation of spheres of influence for cities, adjustments to boundaries of special districts, annexations, incorporations, detachments of areas from cities, and dissolutions of cities. A city's sphere of influence is an indication of the city's future boundaries. Since 1992, state law requires that incorporation of a new city must not financially harm the county and must result in a positive cash flow for the new city, a requirement that has slowed the rate of new city incorporation.

The California Land Conservation Act (Williamson Act)

The California Land Conservation Act, better known as the Williamson Act, was enacted by the California State Legislature in 1965 to encourage the preservation of agricultural

lands. The Williamson Act program permits property tax adjustments for landowners who contract with a city or county to keep their land in agricultural production or approved open space uses for at least 10 years. Lands covered by Williamson Act contracts are assessed on the basis of their agricultural value instead of their potential market value under nonagricultural uses. In return for the preferential tax rate, the landowner is required to contractually agree to not develop the land for a period of at least 10 years. Williamson Act contracts are renewed annually for 10 years unless a party to the contract files for nonrenewal. The filing of a non-renewal application by a landowner ends the automatic annual extension of a contract and starts a 9-year phase-out of the contract. During the phase-out period, the land remains restricted to agricultural and open-space uses, but property taxes gradually return to levels associated with the market value of the land. At the end of the 9-year non-renewal process, the contract expires and the owner's uses of the land are restricted only by applicable local zoning. The Williamson Act defines *compatible use* of contracted lands as any use determined by the county or city administering the agricultural preserve to be compatible with the agricultural, recreational, or open space use of land within the preserve and subject to contract (Government Code, Section 51202[e]). However, uses deemed compatible by a county or city government must be consistent with the principles of compatibility set forth in Government Code, Section 51238.1.

State Lands Commission Significant Lands Inventory

The State Lands Commission is responsible for managing lands owned by the state, including lands that the state has received from the federal government. These lands total more than four million acres and include tide and submerged lands, swamp and overflow lands, the beds of navigable waterways, and state school lands. The State Lands Commission has a legal responsibility for, and a strong interest in, protecting the ecological and Public Trust values associated with the State's sovereign lands, including the use of these lands for habitat preservation, open space and recreation. Scoping Plan projects located within these lands would be subject to the State Lands Commission permitting process.

California Endangered Species Act

See Chapter 7, *Biological Resources*, for a discussion of this state regulation. DFG has no direct land use authority, but in enforcing the requirements of the CESA, participates with the federal resource agencies (Army Corps of Engineers, USFWS, and U.S. EPA) in commenting on the impacts of new development on natural resource areas.

c. Local Regulations

General Plans

The most comprehensive land use planning is provided by city and county general plans, which local governments are required by state law to prepare as a guide for future development. The general plan contains goals and policies concerning topics that are mandated by state law or which the jurisdiction has chosen to include. Required topics are: land use, circulation, housing, conservation, open space, noise, and safety. Other topics that local governments frequently choose to address are public

facilities, parks and recreation, community design, or growth management, among others. City and county general plans must be consistent with each other. County general plans must cover areas not included by city general plans (i.e., unincorporated areas).

Specific and Community Plans

A city or county may also provide land use planning by developing community or specific plans for smaller, more specific areas within their jurisdiction. These more localized plans provide for focused guidance for developing a specific area, with development standards tailored to the area, as well as systematic implementation of the general plan. Specific and community plans are required to be consistent with the city or county's general plan.

Zoning

The city or county zoning code is the set of detailed requirements that implement the general plan policies at the level of the individual parcel. The zoning code presents standards for different uses and identifies which uses are allowed in the various zoning districts of the jurisdiction. Since 1971, state law has required the city or county zoning code to be consistent with the jurisdiction's general plan, except in charter cities.

Housing Element Law

State law requires each city and county to adopt a general plan containing at least seven mandatory elements including housing. Unlike the other general plan elements, the housing element, required to be updated every five to six years, is subject to detailed statutory requirements and mandatory review by a State agency, the California Department of Housing and Community Development (Department). Housing elements have been mandatory portions of local general plans since 1969. This reflects the statutory recognition that housing is a matter of statewide importance and cooperation between government and the private sector is critical to attainment of the State's housing goals. The availability of an adequate supply of housing affordable to workers, families, and seniors is critical to the State's long-term economic competitiveness and the quality of life for all Californians.

10. Noise Regulatory Setting

a. Federal Regulations

The federal Noise Control Act of 1972 (Public Law 92-574) established a requirement that all federal agencies administer their programs to promote an environment free of noise that would jeopardize public health or welfare. The U.S. EPA was given the responsibility for:

- providing information to the public regarding identifiable effects of noise on public health and welfare,
- publishing information on the levels of environmental noise that will protect the public health and welfare with an adequate margin of safety,

- coordinating federal research and activities related to noise control, and
- establishing federal noise emission standards for selected products distributed in interstate commerce.

The Noise Control Act also directed that all federal agencies comply with applicable federal, state, interstate, and local noise control regulations. Although the U.S. EPA was given a major role in disseminating information to the public and coordinating with other federal agencies, each federal agency retains authority to adopt noise regulations pertaining to agency programs. The U.S. EPA can, however, require other federal agencies, such as those listed below, to justify their noise regulations in terms of Noise Control Act policy requirements.

Federal Highway Administration (FHWA): Noise standards for federally funded highway projects

Federal Transit Administration (FTA): Noise standards for federally funded transit projects

Federal Railroad Administration (FRA): Noise standards for federally funded rail projects.

U.S. Environmental Protection Agency

In 1974, in response to the requirements of the federal Noise Control Act, the U.S. EPA identified indoor and outdoor noise limits to protect public health and welfare (communication disruption, sleep disturbance, and hearing damage). Outdoor Ldn limits of 55 dB and indoor Ldn limits of 45 dB are identified as desirable to protect against speech interference and sleep disturbance for residential, educational, and healthcare areas. Sound-level criteria to protect against hearing damage in commercial and industrial areas are identified as 24-hour Leq values of 70 dB (both outdoors and indoors).

Federal Transit Administration

FTA procedures for the evaluation noise from transit projects are specified in the document titled, “Transit Noise and Vibration Impact Assessment” (Federal Transit Administration, 2006). The FTA Noise Impact Criteria categorizes noise-sensitive land uses into the following categories.

- *Category 1*: Buildings or parks where quiet is an essential element of their purpose.
- *Category 2*: Residences and buildings where people normally sleep. This includes residences, hospitals, and hotels where nighttime sensitivity is assumed to be of utmost importance.

- *Category 3*: Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, churches, and active parks.

Ldn is used to characterize noise exposure for residential areas (Category 2). For other noise sensitive land uses, such as outdoor amphitheaters and school buildings (Categories 1 and 3), the maximum 1-hour Leq during the facility's operating period is used. Noise impacts are identified based on absolute predicted noise levels and increases in noise associated with the project.

Federal Railroad Administration

FRA noise standards are the same as those specified by the FTA.

Quiet Communities Act (1978)

This act promotes the development of effective state and local noise control programs, to provide funds for noise research, and to produce and disseminate educational materials to the public on the harmful effects of noise and ways to effectively control it.

24 CFR, Part 51B (U.S. Department of Housing and Urban Development [HUD])

This regulation established standards for HUD-assisted projects and actions, requirements, and guidelines on noise abatement and control.

Federal Aviation Administration (FAA) Order 1050.1D

This order contains policies and procedures for considering environmental impacts.

14 CFR, Part 150 (FAA)

These address airport noise compatibility planning and include a system for measuring airport noise impacts and present guidelines for identifying incompatible land uses. All land uses are considered compatible with noise levels of less than 65 dBA L_{dn}. At higher noise levels, selected land uses are also deemed acceptable, depending on the nature of the use and the degree of structural noise attenuation provided.

International Standards and Recommended Practices (International Civil Aviation Organization)

This contains policies and procedures for considering environmental impacts (e.g., aircraft noise emission standards and atmospheric sound attenuation factors).

32 CFR, Part 256 (Department of Defense Air Installations Compatible Use Zones [AICUZ] Program)

AICUZ plans prepared for individual airfields are primarily intended as recommendations to local communities regarding the importance of maintaining land uses which are compatible with the noise and safety impacts of military aircraft operations.

29 CFR, Part 1910, Section 1910.95 (U.S. Department of Labor Occupational Safety and Health Administration [OSHA])

This regulation established a standard for noise exposure in the workplace.

b. State Regulations

California Department of Transportation Traffic Noise Analysis Protocol

The California Department of Transportation (Caltrans) Traffic Noise Analysis Protocol (Protocol) specifies the policies, procedures, and practices to be used by agencies that sponsor new construction or reconstruction projects. The noise abatement criteria specified in the Protocol are the same as those specified in 23 CFR 772. The Protocol defines a noise increase as substantial when the predicted noise levels with project implementation exceed existing noise levels by 12 dBA. The Protocol also states that a sound level is considered to approach a Noise Abatement Criteria (NAC) level when the sound level is within 1 dB of the NAC identified in 23 CFR 772 (e.g., 66 dBA is considered to approach the NAC of 67 dBA, but 65 dBA is not).

California General Plan Guidelines

The California General Plan Guidelines (California Governor's Office of Planning and Research 2003) identifies guidelines for the noise elements of city and county general plans, including a sound level/land-use compatibility chart that categorizes, by land use, outdoor Ldn ranges in up to four categories (normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable). These guidelines provide the State's recommendations for city and county general plan noise elements. Compliance with the guidelines by the cities and counties is not required, but nonetheless is quite common because many general plan noise elements are based on these guidelines. These guidelines are not applicable to projects without a city or county sponsor.

Title 24, Part 2, California Code of Regulations

These establish standards governing interior noise levels that apply to all new single-family and multi-family residential units in California. These standards require that acoustical studies be performed before construction at building locations where the existing L_{dn} exceeds 60 dBA. Such acoustical studies are required to establish mitigation that will limit maximum L_{dn} levels to 45 dBA in any habitable room.

Section 5000 et seq. of the California Code of Regulations (Title 21, Division 2.5, Chapter 6), California Airport Noise Regulations promulgated in accordance with the State Aeronautics Act

In Section 5006, the regulations state that: "The level of noise acceptable to a reasonable person residing in the vicinity of an airport is established as a CNEL value of 65 dBA for purposes of these regulations. This criterion level has been chosen for reasonable persons residing in urban residential areas where houses are of typical California construction and may have windows partially open. It has been selected with reference to speech, sleep and community reaction.

California Streets and Highways Code Section 216 (Freeway Noise in Classrooms)

This section, known as the Control of Freeway Noise in School Classrooms, requires that, in general, Caltrans abate noise from freeways to specified levels when the noise exceeds specified levels in school classrooms

California Government Code Section 65302 (Provision of Noise Contour Maps)

This section requires Caltrans to provide cities and counties with noise contour maps along state highways.

c. Local Regulations

Some jurisdictions also have noise ordinances. The noise element and local noise ordinances are the two primary documents that local jurisdictions use to set noise standards in their community. A noise element is a required component of each jurisdiction's general plan.

11. Population and Housing Regulatory Setting

As Housing and Transportation are interrelated, this discussion includes the Transportation planning regulatory requirements.

a. Federal Regulations

23 Code of Federal Regulations (CFR) Part 450.322

The Code of Federal Regulations pertaining to the Department of Transportation contains guidelines for statewide and metropolitan transportation planning. These were last updated on August 10, 2005 when the Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEALU) was enacted. The rules and regulations require that the metropolitan planning organization (MPO) review and update the transportation plan to confirm the transportation plan's validity and consistency with current and forecasted transportation and land use conditions and trends and to extend the forecast period to at least a 20-year planning horizon.

b. State Regulations

California Transportation Commission (CTC) Regional Transportation Plan (RTP) Guidelines

Pursuant to Government Code Section 65080(c), each Regional Transportation Planning Agency (RTPA) is required to adopt and submit an updated Regional Transportation Plan (RTP) to the California Transportation Commission (CTC) and the Department of Transportation (Caltrans) every four years. SACOG is designated RTPA for Sacramento, Yolo, Sutter and Yuba counties. Under Government Code Section 14522, the CTC is authorized to prepare guidelines to assist in the preparation of RTPs. The CTC's RTP guidelines suggest that projections used in the development of an RTP should be based upon available data (such as from the Bureau of the Census), use

acceptable forecasting methodologies, and be consistent with the Department of Finance baseline projections for the region. The guidelines further state that the RTP should identify and discuss any differences between the agency projections and those of the Department of Finance.

State of California Government Code Section 65000 et seq)

Planning and Zoning Law requires each city and county to adopt a general plan for the physical development of the land within its planning area. The general plan must contain land use, housing, circulation, open space, conservation, noise, and safety elements as well as any other elements that the city or county may wish to adopt. The circulation element of a local general plan must be correlated with the land use element. The housing element of the general plan must incorporate policies and programs that will allow sufficient housing to be built to meet the jurisdiction's share of the Regional Housing Needs Allocation (RHNA).

Council of governments in the state, receive an overall regional allocation, and must develop a methodology for calculating and distributing to each jurisdiction its fair share of the allocation. Each city and county in the MTP Plan Area will receive an allocation of total number of housing units that it must plan for within a 7.5 year time period. Allocations are distributed to each jurisdiction based on the state's defined four economic categories very low, low, moderate and above moderate incomes. The sum of the allocations of these four categories must equal the overall allocation for that jurisdiction. Each jurisdiction must then develop its housing element to address how it will zone for enough units of housing units during the 7.5 year period to meet the overall allocation and allocations by income category.

A copy of the draft housing element must be sent to the California Department of Housing and Community Development (HCD) for review and comment before it may be adopted by the city or county. HCD will advise the local jurisdiction about the element's compliance with Housing Element Law (Government Code Section 65580 et seq.) A housing element approved by HCD is presumed to meet the requirements of Housing Element Law. As part of its responsibilities in the process of preparing local housing elements, HCD provides regional housing need projections to the regional councils of government around the state approximately every 5 years. In turn, the councils are responsible for preparing a regional housing needs assessment that specifically enumerates each city's and county's fair share of the regional housing need by economic segment. Each city or county must then amend its housing element to accommodate that fair share.

c. Local Regulations

Required through City/County General Plans

The housing element is one of the seven mandated elements of the local general plan. Housing element law, enacted in 1969, mandates that local governments adequately plan to meet the existing and projected housing needs of all economic segments of the community. The law acknowledges that, in order for the private market to adequately

address housing needs and demand, local governments must adopt land use plans and regulatory systems which provide opportunities for, and do not unduly constrain, housing development. As a result, housing policy in the State rests largely upon the effective implementation of local general plans and, in particular, local housing elements.

12. Transportation Regulatory Setting

a. Federal Regulations

Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)

Under SAFETEA-LU, the U.S. Department of Transportation, Federal Highway Administration (FHWA), and Federal Transit Administration (FTA) require that Metropolitan Planning Organizations (MPO's) prepare and submit a metropolitan transportation plan. In regions that are designated federal air quality non-attainment areas, these plans must be updated at least every four years. The federal requirements for metropolitan transportation plans include a number of key provisions that are outlined below.

- Plans must be developed through an open process that encourages and includes public input
- Plans must cover a period of at least 20 years into the future
- Plans must reflect the most recent assumptions for population, employment, land use, travel,
- congestion, and economic activity
- Plans must be financially conservative and must contain reasonable revenue assumptions
- Plans must conform to the SIP for air quality
- Plans must meet the air quality budget set for the SIP
- Plans must consider key planning factors in the local context such as economic vitality, safety, security, accessibility and mobility of people and freight, environmental protection, transportation system integration, system efficiency, and preservation of existing transportation system.

b. State Regulations

The state has similar requirements for the MTP, known as a regional transportation plan (RTP) under state law. The State requirements include several additional provisions. Some of these include:

- compliance with CEQA;
- consistency with State Transportation Improvement Program;
- use of program level performance measures that include goals and objectives; and
- development of three specific elements in the RTP including a policy element, an action element, and a financial element.

California Government Code

The state Government Code requires that the regional transportation planning process be integrated with the state transportation planning process, and that development of state and regional transportation plans is a prerequisite for receipt of federal transportation funds. A regional transportation plan must be submitted every four years to the California Transportation Commission (CTC) and to the California Department of Transportation (Caltrans). It is further required that the preparation of these plans is required to be a cooperative process involving local and regional government, transit operators, congestion management agencies, and the goods movement industry and that the process be a continuation of activities performed by each entity and be performed without any additional cost.

c. Local Regulations

Several agencies are involved in transportation planning and programming in the State. At a regional level, the Councils of Governments have a primary role as the federally designated metropolitan planning organizations and as the state designated regional transportation planning agency. Many local agencies establish standards of performance for roadways within their jurisdictions. The most common standards apply to peak hour operations at surface street intersections, which are defined as a minimum level-of-service or LOS. LOS is typically defined on an A through F scale, with A corresponding with little or no delay, and F with a high level of delay. The specific standard applied, calculation methodology, and exceptions for unique conditions vary widely among jurisdictions. The standards are applied on a location-by-location basis, and do not account for overall system performance either within the jurisdiction, or in areas outside the jurisdictions. The performance measures used for evaluation of the MTP in this document are intended to supplement these local standards by focusing explicitly on overall system performance.

13. Utilities Regulatory Setting

a. Federal Regulations

See related regulations in the Energy Regulatory Setting section

b. State Regulations

State Fire Responsibility Areas

Areas delineated by the California Department of Forestry and Fire Protection (CAL FIRE) for which the State assumes primary financial responsibility for protecting natural resources from damages of fire. Local jurisdictions are required to adopt minimum recommended requirements for road design, road identification, emergency fire suppression and fuel breaks and greenbelts. All projects within or adjacent to a State Fire Responsibility Area must meet these requirements.

State Education Code Section 17620 authorizes school districts to levy a fee, charge, dedication, or other requirement for any development project for the construction or reconstruction of school facilities.

California Public Utilities Commission, Section 95-08-038

This section contains the rules for planning and construction of new transmission facilities, distribution facilities, and substations. The CPUC requires permits for the construction of certain power line facilities or substations if the voltages would exceed certain thresholds.

Clean Water Act (CWA)

Enacted in 1972, this federal legislation completely revised the pre-existing Water Pollution Control Act. Section 304 of the Clean Water Act established primary drinking water standards. States are required to ensure that potable water retailed to the public meets these standards. State primary and secondary drinking water standards are promulgated in CCR Title 22 Section 64431-64501. Secondary drinking water standards incorporate non-health risk factors including taste, odor, and appearance.

The National Pollutant Discharge Elimination System (NPDES) regulates the discharge of drainage to surface waters. Federal NPDES regulations are administered by the California State Water Resources Control Board and through the Regional Water Quality Control Boards. Municipal storm drainage is required to meet Board standards under waste discharge regulations/NPDES permits.

Federal Power Act of 1935

In the Federal Power Act of 1935 (49 Stat. 803), created the Federal Power Commission, an independent regulatory agency with authority over both the interstate transmission of electricity and the sale of hydroelectric power at the wholesale level. The act requires the commission to ensure that electricity rates are "reasonable, nondiscriminatory and just to the consumer." The Federal Power Act of 1935 also amended the criteria that the commission must apply in deciding whether to license the construction and operation of new hydroelectric facilities.

Federal Safe Drinking Water Act (as amended)

The Safe Drinking Water Act (SDWA), promulgated by Congress in 1974, amended in 1986 and 1996, establishes a Federal program to monitor and increase the safety of the

nation's drinking water supply. The SDWA authorizes the U.S. EPA to set and implement health-based standards to protect against both naturally occurring and man-made contaminants in drinking water. The U.S. EPA is also responsible for assessing and protecting drinking water sources; protecting wells and collection systems; making sure water is treated by qualified operators; ensuring the integrity of distribution systems; and making information available to the public on the quality of their drinking water.

Natural Gas Act of 1938

Together with the Federal Power Act of 1935, the Natural Gas Act of 1938 (NGA) (P.L. 75-688, 52 Stat. 821) was an essential piece of energy legislation in the first half of the twentieth century. These statutes regulated interstate activities of the electric and natural gas industries, respectively. The acts are similarly structured and constitute the classic form of command-and-control regulation authorizing the federal government to enter into a regulatory compact with utilities. In short, the Natural Gas Act enabled federal regulators to set prices for gas sold in interstate commerce in exchange for exclusive rights to transport the gas.

Natural Gas Policy Act of 1978

The Natural Gas Policy Act of 1978 (NGPA) granted the Federal Energy Regulatory Commission (FERC) authority over intrastate as well as interstate natural gas production. The NGPA established price ceilings for wellhead first sales of gas that vary with the applicable gas category and gradually increase over time.

Resource Conservation and Recovery Act of 1976

40 CFR, Part 258 Subtitle D of the RCRA establishes minimum location standards for siting municipal solid waste landfills. Because California laws and regulations governing the approval of solid waste landfills meet the requirements of Subtitle D, the U.S. EPA has delegated the enforcement responsibility to California. California laws and regulations governing these facilities are summarized in the section below.

Telecommunications Act of 1996

The Telecommunications Act of 1996 was the first major overhaul of United States telecommunications law in nearly 62 years, amending the Communications Act of 1934. It was approved by Congress on January 3, 1996. Telecommunications legislation passed by the U.S. Congress in 1996. The Act deregulates of local phone service, and allows long-distance carriers and cable television companies to provide local phone service, as well allowing local telephone companies to provide long distance service.

Safe Drinking Water and Toxic Enforcement Act of 1986

Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986, was enacted as a ballot initiative in November 1986. The Proposition was intended by its authors to protect California citizens and the State's drinking water sources from chemicals known to cause cancer, birth defects or other reproductive harm, and to inform citizens about exposures to such chemicals.

California Water Recycling Act

Enacted in 1991, the California Water Recycling Act (California Water Code 13577) established water recycling as a priority in California. The Act encourages municipal wastewater treatment districts to implement recycling programs to reduce local water demands. The Act set recycling goals of 700,000 acre-feet of water annually by year 2000 and 1 MAF annually by 2010.

Porter-Cologne Water Quality Control Act (Section 13000 et seq.)

The Porter Cologne Act directs the State Water Resources Control Board (SWRCB) and Regional Water Quality Control Boards (RWQCBs) to prepare Water Quality Control Plans (Basin Plans), establishing water quality objectives and beneficial uses for each body of water within the regional boundaries including groundwater basins. The RWQCB issues waste discharge requirements (WDRs) for discharges of privately or publicly treated domestic wastewater to locations other than surface water. These WDRs are usually designed to protect beneficial uses of groundwater basins but can be issued to protect surface waters in areas where groundwater is known to infiltrate into surface waters. Many municipal wastewater treatment facilities do not have NPDES permits, but rather are issued WDRs for discharges to surface impoundments and percolation ponds. The RWQCB also issues waste reclamation requirements (WRRs) for treated wastewater used exclusively for reclamation projects such as irrigation and groundwater recharge.

The Porter Cologne Act empowers the SWRCB and RWQCBs to protect the beneficial use of California waters. Thereby, it provides broader authority than offered by the Federal CWA alone.

Regional Water Quality Control Boards (RWQCB)

New or expanded landfills must submit Reports of Waste Discharge to RWQCBs prior to landfill operations. In conjunction with the CIWMB approval of SWFPs, RWQCBs issue Waste Discharge Orders, which regulate the liner, leachate control and removal, and groundwater monitoring systems at Class III landfills. While Waste Discharge Orders only apply to landfills, RWQCBs also regulate surface water runoff for all solid waste facilities by issuing stormwater discharge permits under the NPDES program. Separate NPDES permits are issued for the construction and operation of these facilities.

California Code of Regulations

Title 23, Division 3, Article 2 (Waste Classification and Management), Article 3 (Waste Unit Classification and Siting), and Class III (municipal solid waste) establish criteria for the siting of landfills. These regulations address design, construction, operation, and groundwater monitoring requirements of solid waste landfills. Title 14 CCR Chapter 3 establishes minimum standards for solid waste handling and disposal. Article 6.0 of Chapter 3 establishes minimum standards for solid waste transfer stations. Composting facility operating requirements are found in Chapter 3.1. Both of these chapters establish different standards for different size facilities. Standards found in these chapters relate to the cleaning of these facilities, drainage control, dust control, the

detection of household hazardous waste, litter control, noise control, vectors, odors and other potential impacts resulting from the operation of these facilities.

Integrated Waste Management Act of 1989 (Assembly Bill 939)

AB 939 established the California Integrated Waste Management Board (CIWMB), and set forth aggressive solid waste diversion requirements. Under AB 939, every city and county in California is required to reduce the volume of waste sent to landfills by 50%, through recycling, reuse, composting, and other means. AB 939 requires counties to prepare a Countywide Integrated Waste Management Plan (CIWMP). An adequate CIWMP contains a summary plan that includes goals and objectives, a summary of waste management issues and problems identified in the incorporated and unincorporated areas of the county, a summary of waste management programs and infrastructure, information about existing and proposed solid waste facilities, and an overview of specific steps that will be taken to achieve the goals outlined in the components of the CIWMP.

Senate Bill 610 Water Supply Assessment

SB 610 of 2001 (enacting Water Code Section 10910, et seq.) provides that before a city or county can consider a large project (typically defined as a residential project of 500 or more units, or its equivalent) it must request of the prospective water supplier a water supply assessment (WSA). The purpose of the WSA is to disclose the availability of short-term and long-term water supplies, in normal, dry, and multiple dry years, to serve the project. This information must be included in the EIR or Negative Declaration being prepared for the project. It will be considered by the city or county when deciding whether to approve the project. A companion measure, SB 221 of 2001, similarly requires preparation of a water supply sufficiency analysis for proposed subdivisions creating 500 lots or more. It provides that no such subdivision is to be approved by a city or county in the absence of a secure water supply, absent specific findings. The findings must specify those means that the water supply is to be secured in the future.

California Environmental Quality Act

CEQA (Public Resources Code Section 21000 et seq.) requires the environmental analyses prepared for projects to disclose the availability of water to serve those projects, identify feasible mitigation measures to ensure water is available, and to disclose any impacts that may arise from providing water, if current supplies are insufficient. Neither SB 610 nor SB 221 obviates the responsibility of local agencies under CEQA to assess the water needs of projects involving fewer than 500 residents.

Urban Water Management Planning Act

The Urban Water Management Planning Act (Water Code Sections 10610 - 10656) mandates that every urban water supplier providing water to 3,000 or more customers, or that provides over 3,000 acre-feet of water annually, should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry years. Typically, these suppliers include water districts, irrigation districts, and cities. The Act requires each such agency to prepare an Urban Water Management Plan on a regular

basis and establishes the contents of those plans. The Urban Water Management Plans are submitted to the DWR every five years. The Urban Water Management Plan can be used as the basis for WSAs for individual projects, as well as background information for the preparation of city and county general plans. The intention of the Act is to foster better awareness among local governments of the water supply available to support future growth.

c. Local Regulations

Local general plans have goals and policies related to utility infrastructure and public services. Utility services are also governed by local ordinances for cable television, wastewater treatment facilities, water supply, and solid waste services. Cities and counties are also subject to the SB 610 and SB 221 requirements noted above, and will impose them on qualifying projects.

Local Agency Formation Commissions

The Cortese-K NO_x-Hertzberg Act of 2000 (Government Code Section 56000, et seq.), establishes the process through which local agency boundaries are established and revised. Each county must have a local agency formation commission (LAFCO), which is the agency that has the responsibility to create orderly local government boundaries, with the goal of encouraging "planned, well-ordered, efficient urban development patterns," the preservation of open-space lands, and the discouragement of urban cities, and one member of the public. Many LAFCOs also include one special district representative.

A "Sphere of Influence" is the physical boundary and service area that a local governmental agency is expected to serve, as determined by LAFCO. Establishment of this boundary is necessary to determine which governmental agencies can provide services in the most efficient way to the people and property in any given area. The Sphere of Influence requirement also works to discourage urban sprawl by preventing overlapping of jurisdictions and duplication of services.

OPR has recently published the *Municipal Service Review Guidelines*, which provide guidance for Local Agency Formation Commissions (LAFCOs) to address the delivery of municipal services at a regional level, in a manner that informs other LAFCO boundary-setting decisions.

14. Transport of Hazardous Materials

a. Federal Regulations

The Federal Hazardous Materials Regulations (FHMR)are found in Title 49, Code of Federal Regulations, Parts 100-180. The regulations establish criteria for the safe transport of hazardous materials. Compliance is mandatory for intrastate and interstate transportation.

b. State Regulations

The regulations pertaining to the safe transport of hazardous materials in California are contained in Vehicle Code Sections 31301-31309. All motor carriers and drivers involved in transportation of hazardous materials must comply with the requirements contained in federal and state regulations, and must apply for and obtain a hazardous materials transportation license from the California Highway Patrol (CHP). A driver is required to obtain a hazardous materials endorsement issued by the driver's country or state of domicile to operate any commercial vehicle carrying hazardous materials. The driver is required to display placards or markings while hauling hazardous waste, unless the driver is exempt from the endorsement requirements. A driver who is a California resident is required to obtain an endorsement from CHP.

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B. Environmental Justice

In California, environmental justice is defined in state law as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies (SB 115, Solis, 1999; California Government Code § 65040.12(c) and defined in statute by SB 115 (Solis, Chapter 690, Statutes 1999).

The California Environmental Protection Agency (Cal/EPA) has an Environmental Justice Action Plan and an Environmental Justice Strategy providing guidance within the agency to develop and conduct public health and environmental protection programs, policies, and activities in a manner that promotes equity and affords fair treatment, accessibility, and protection for all Californians, regardless of race, age, culture, income, or geographic location. The documents are available at http://www.calepa.ca.gov/envjustice/.

ARB approved Environmental Justice Policies and Actions (Policies) on December 13, 2001, establishing a framework for incorporating environmental justice into ARB programs. These Policies promote the consideration and fair treatment of all Californians and cover the full spectrum of ARB activities. ARB Environmental Justice Policies are available at http://www.arb.ca.gov/ch/programs/ej/ej.htm.

AB 32 is the legislation implementing Executive Order S-3-05 which directs California to reduce GHG emissions to 1990 levels by 2020. AB 32 includes specific guidance concerning environmental justice which states,

When considering GHG emissions reduction regulations, the ARB must, to the extent feasible:

- Ensure that activities undertaken to comply with the regulations do not disproportionately impact low-income communities (HSC §38562(b)(2)),
- Ensure that activities undertaken pursuant to the regulations complement, and do not interfere with, efforts to achieve and maintain national and California AAQS, and to reduce TAC emissions (HSC§38562(b)(4)),
- Consider overall societal benefits, including reductions in other air pollutants, diversification of energy sources, and other benefits to the economy, environment, and public health. (HSC§38562(b)(6)), and,
- Maximize additional environmental and economic co-benefits for California and complements the state's efforts to improve air quality (HSC§38501(h)).

ARB is committed to making the achievement of fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation and enforcement of environmental laws, regulations, and policies. This commitment is an

integral part of development and implementation of the proposed cap-and-trade program.

Issues relating to meeting environmental justice standards are typically addressed in two categories of potential inequity: "procedural inequity" – referring to the public participation process itself, and "geographical inequity" which refers to undesirable land uses concentrated in certain neighborhoods while benefits are received elsewhere or where "public amenities are concentrated only in certain areas".

1. Procedural Inequity

ARB conducts a transparent regulation development and approval process. Comments solicited from stakeholders and the general public during workshops and public meetings are essential to effective decision-making and regularly contribute to positive revisions of draft documents prior to Board adoption. The proposed cap-and-trade regulation is a component of the Scoping Plan and builds on the experience obtained during development of the Scoping Plan, including input from the AB 32 Environmental Justice Advisory Committee (EJAC).

Since February 2009, ARB has conducted more than 30 public meetings related to development of the cap-and-trade regulation. Meetings have included technical sessions such as Economic and Allocation Advisory Committee (EAAC) meetings, staff workshops, and Board meetings. Comments received during these meetings have identified issues similar to those identified during development of the Scoping Plan, foremost being the potential inequitable localized implementation of actions that could increase pollutant emissions from facilities located in already adversely impacted communities and potential uses of allowance value.

2. Geographical Inequity

Potential impacts resulting from compliance with cap-and-trade regulation were analyzed pursuant to requirements specified in AB 32, to ensure no geographically-based and/or procedurally-based inequities occur as a result of regulatory adoption. ARB must, to the extent feasible, "have considered the potential for direct, indirect, and cumulative emission impacts from market-based mechanisms, including localized impacts in communities that are already adversely impacted by air pollution" and design its cap-and-trade regulation "to prevent any increase in the emissions of toxic air contaminants or criteria pollutants" and "maximize additional environmental and economic benefits for California" as appropriate (HSC §38570 et seq).

A key concept of a market based cap-and-trade regulation is the ability of covered entities to determine the most efficient manner in which to comply with the regulation. The cap-and-trade regulation does not stipulate measures (compliance responses) or locations where emissions reduction measures should be implemented, but rather relies on market conditions to influence how individual entities choose to comply with the regulation. The preferred reduction measure (compliance response) is assumed to be

the less costly action and would be the initial measure implemented. As future cap levels are reduced and the emission reductions obtained from the initial measure are exhausted, entities would be reasonably expected to shift to the next least expensive measure.

The extent of GHG reduction measures implemented in any community will depend on the covered facilities, and the magnitude and cost of potential GHG emissions reductions from facilities in each community. The proposed cap-and-trade regulation does not alter existing regulatory controls, emission standards, or permits, and existing regulatory controls do not allow the implementation of GHG measures that could cause other emissions to exceed permitted levels.

To the extent possible, ARB has evaluated the potential adverse environmental impacts of the proposed cap-and-trade regulation on already adversely impacted communities. While the cap-and-trade regulation allows for flexibility in how facilities comply, staff looked at several scenarios that bound the possibilities, including the construction of a new facility. If emission reductions due to implementing the cap-and-trade regulation occur locally at the facilities in the four assessment areas, there could be some small additional co-benefits from the reduction of combustion-related criteria pollutants. Potential emissions increases that might occur in general are also expected to be small within the context of the larger cumulative emission reductions that will be occurring as a result of California's extensive emissions control programs. Based on the available data and current law and policies that control localized air pollution, and expected compliance responses to the cap-and-trade regulation, ARB concludes that, increases in localized air pollution, including toxic air contaminants and criteria air pollutants, attributable to the cap-and-trade program are extremely unlikely. For additional information, see the Air Quality Impact Section 4.B.4 and the Co-Pollutant Emissions Assessment that is Appendix P of the ISOR.

11.0 LIST OF FIGURES

Figure 2-1 Adaptive Management Process 44

Figure 2-2 Distribution of Facilities Emitting > 25,000 $MTCO_2e$ 53

Figure 3-1 Statewide Ozone Precursor Emission Trends..... 100

Figure 3-2 Statewide On-Road Mobile Source PM2.5 Emission Trends 101

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12.0 LIST OF TABLES

Table 3-1 Rules Adopted Pursuant to the 2007 State Strategy 98

Table 3-2 Goods Movement Program Control Targets for 2020 99

Table 3-3 Compliance with Federal Ozone Air Quality Standards in California's Major Urban Areas 102

Table 3-4 Population Density and Associated Ambient Noise Levels 119

Table 4B-1 Statewide Emissions (Existing Condition) Existing ARB Rules and Scoping Plan Measures 150

Table 4B-2 Statewide Emissions 151

All ARB Rules and Foreseeable Scoping Plan Measures 151

Table 4B-3 Statewide Diesel Particulate Matter Emissions 152

Table 4B-3 Estimated Criteria Pollutant Emissions Hypothetical Combined Heat and Power Facility 160

Table 4B-5 Percent of Emissions Reductions Between 2008 and 2020 Wilmington Area[1] 161

Table 4B-6 Estimated Criteria Pollutant Emissions Hypothetical Biofuel Refining Facility (50 million gallons/year capacity) 163

Table 4B-7 Percent Emissions Reductions Between 2008 and 2020 Bakersfield Area[1] 164

Table 4B-8 Estimated Criteria Pollutant Emissions Hypothetical Combined Heat and Power Facility (85 MW Capacity) 166

Table 4B-9 Percent of Emissions Reductions Between 2008 and 2020 Richmond Area[1] 167

Table 4B-10 Estimated Criteria Pollutant Emissions Hypothetical Combined-Cycle Natural Gas Baseload Power Plant (500 MW Capacity) 169

Table 4B-11 Percent Emissions Reductions Between 2008 and 2020 Oro Grande 170

Table 4C-1 ODS Destruction Facility Locations and Attainment Designations 219

Table 4F-1 Noise Emission Levels from Heavy-Duty Equipment 325

Table 4F-2 Representative Groundborne Noise and Vibration Levels for Construction Equipment 327

Table 6-1 Comparative Likelihood That Alternatives Achieve Project Objectives 395

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13.0 ACRONYMS AND ABBREVIATIONS

AADT	annual average daily traffic
AAQS	ambient air quality standards
AB	Assembly Bill
AB 32	California Global Warming Solutions Act of 2006
ACEC	Area of Critical Environmental Concern
ACTM	airborne toxic control measure
ADT	average daily traffic
AFV	alternative fuel vehicle
AICUZ	Air Installations Compatible Use Zones
ALUC	Airport Land Use Commission
APE	area of potential effect
APS	Alternative Planning Strategy
ARB	California Air Resources Board
BACT	Best Available Control Technology
BARCT	Best Available Retrofit Control Technology
BAU	Business As Usual
BCS	biogas control system
BLM	U.S. Bureau of Land Management
BMPs	Best Management Practices
BOF	basic oxygen furnace
BTU	British Thermal Unit
$CaCO_3$	Lime
CAFE	Corporate Average Fuel Economy
CAL FIRE	California Department of Forestry and Fire Protection
Cal Recycle	California Department of Resources Recycling and Recovery
CalEPA	California Environmental Protection Agency
Caltrans	California Department of Transportation
CAR	Climate Action Reserve
CBSC	California Building Standards Code

CCA	federal Clean Air Act
CCAA	California Clean Air Act
CCNM	California Coastal National Monument
CCP	comprehensive conservation plans
CCR	California Code of Regulations
CCS	carbon capture and sequestration
CDCA	California Desert Conservation Area
CDPA	California Desert Protection Act
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFC	Chlorofluorocarbon
CFCP	California Farmland Conservancy Program
CGS	California Geological Survey
CH_4	Methane
CHP	Combined Heat and Power
CIWMB	California Integrated Waste Management Board
Cl_2	Chlorine
Cm	Centimeter
CNEL	Community Noise Equivalent Level
CO	carbon mo NO_xide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CPUC	California Public Utilities Commission
CRHR	California Register of Historical Resources
CTC	California Transportation Commission
CVP	Central Valley Project
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
dB	Decibel
dBA	A-weighed sound level

dbh	diameter at breast height
DE	destruction efficiency
Delta	San Joaquin Delta
DFG	California Department of Fish and Game
DOE	U.S. Department of Energy
DWR	California Department of Water Resources
EAAC	Economic and Allocation Advisory Committee
EAF	electric arc furnace
EIR	Environmental Impact Report
EISA	Energy Independence and Security Act
EITE	energy-intensive trade-exposed
EJ	Environmental Justice
EJ Policies	Environmental Justice Policies and Actions
EJAC	Environmental Justice Advisory Committee
EPAct	Energy Policy Act of 1992
ERC	emission reduction credit
ETS	emission trading system
FAA	Federal Aviation Administration
FED	Functional Equivalent Document
FEMA	Federal Emergency Management Act
FHMR	Federal Hazardous Materials Regulations
FHWA	Federal Highway Administration
FLPMA	Federal Land Policy and Management Act of 1976
FMMP	Farmland Mapping and Monitoring Program
FPA	Z'Berg-Nejedly Forest Practices Act
FPPA	Farmland Protection Policy Act
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
General Dewatering Permit	General Order for Dewatering and Other Low Threat Discharges to Surface Waters
GHG	greenhouse gas

GPS	global positioning system
GSC	General Stationary Combustion
GWP	global warming potential
H_2S	hydrogen sulfide
HCD	California Department of Housing and Community Development
HCFC	Hydrochlorofluorocarbon
HCl	hydrochloric acid
HFC	Hydrofluorocarbon
HFRA	Healthy Forests Restoration Act
HIA	Health Impact Assessment
HNO_3	nitric acid
HOA	home owners association
Hot Spots Act	Air Toxics Hot Spot Information and Assessment Act
HRA	health risk assessment
HSC	Health and Safety Code
HTF	Highway Trust Fund
HUD	U.S. Department of Housing and Urban Development
in/sec	inches per second
IOU	investor-owned utilities
IPCC	Intergovernmental Panel on Climate Change
ISOR	Initial Statement of Reasons
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
Kg	Kilogram
LAFCO	local agency formation commission
Lb	Pounds
LCFS	Low Carbon Fuel Standard
LDCs	public and investor-owned electric utilities
L_{dn}	day-night noise level
L_{eq}	equivalent noise level
L_{max}	maximum noise level

L_{min}	minimum noise level
LOS	level of service
LPG	liquefied petroleum gas
LVW	loaded vehicle weight
MAF	million acre-feet
MMT	million metric tons
MOA	memorandum of agreement
MPO	Metropolitan Planning Organization
MRZ	Mineral Resource Zone
MSW	municipal solid waste
MT	metric tons
MTP	metropolitan transportation plan
MUC	Multiple-Use Class
MW	Megawatt
MWH	megawatt-hours
Mya	million years ago
N_2	nitrogen
N_2O	nitrous oxide
N_2O_4	nitrogen tetroxide
NAC	Noise Abatement Criteria
NAGPRA	Native American Graves Protection and Repatriation Act of 1990
NAHC	Native American Heritage Commission
NCCP	Natural Community Conservation Planning
NEPA	National Environmental Policy Act
NF_3	nitrogen trifluoride
NFIP	National Flood Insurance Program
NFMA	National Forest Management Act
NGA	Natural Gas Act of 1938
NGL	natural gas liquids
NGPA	Natural Gas Policy Act of 1978

NH_3	Ammonia
NH_4NO_3	ammonium nitrate
NHPA	National Historic Preservation Act
NLCS	National Landscape Conservation System
NMFS	National Marine Fisheries Service
NMP	Nutrient Management Plan
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NSCR	non-selective catalytic reduction
NSPS	New Source Performance Standard
NSR	New Source Review
ODS	Ozone Depleting Substances
OMP	Odor Management Plan
OPR	Office of Planning and Research
OSHA	Occupational Safety and Health Administration
PERC	Perchloroethylene
PFC	Perfluorocarbon
PM	particulate matter
PM_{10}	respirable particulate matter with an aerodynamic resistance diameter of 10 microns or less
$PM_{2.5}$	fine particulate matter with an aerodynamic resistance diameter of 2.5 microns or less
POU	publicly-owned utilities
ppm	parts per million
PPV	peak particle velocity
PRC	Public Resources Code
RACT	Reasonably Available Control Technology
RBOB	California Reformulated Blendstock for Oxygenate Blending

RCRA	Resource Conservation and Recovery Act
RECLAIM	South Coast Regional Clean Air Incentives Market
REDD	Reduced Emissions from Deforestation and Forest Degradation
RES	Renewable Electricity Standard
RETI	Renewable Energy Transmission Initiative
RFS	Renewable Fuel Standard
RMP	Resource Management Plan
RMS	root-mean-square
ROG	reactive organic gases
RPS	Renewables Portfolio Standard
RTP	regional transportation plan
RTPA	Regional Transportation Planning Agency
RWQCB	regional water quality control boards
SACOG	Sacramento Area Council of Governments
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SB	Senate Bill
SBE	State Board of Education
SCAQMD	South Coast Air Quality Management District
Scoping Plan	Climate Change Scoping Plan
SCR	selective catalytic reduction
SCS	Sustainable Communities Strategy
SDC	Seismic Design Criteria
SDWA	Safe Drinking Water Act
SF_6	sulfur hexafluoride
SHMA	Seismic Hazards Mapping Act
SIP	State Implementation Plan
SMARA	California Surface Mining and Reclamation Act
SMR	steam methane reforming
SO_2	sulfur dioxide
SO_x	sulfur oxides

SWP	State Water Project
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	California Water Resources Control Board
TAC	toxic air contaminant
TCF	total chlorine-free
TEA-21	Transportation Equity Act for the 21st Century
TEAP	United Nations Environment Programme's Technology and Economic Assessment Panel
THP	Timber Harvest Plan
TIP	transportation improvement program
TMDL	total maximum daily load
TPZ	timberland production zone
U.S.	United States
UBC	Uniform Building Code
UK	United Kingdom
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USDOT	U.S. Department of Transportation
U.S. EPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
V/C	volume-to-capacity ratio
VdB	vibration decibels
VOCs	volatile organic compounds
WCI	Western Climate Initiative
WDRs	waste discharge requirements
Williamson Act	The California Land Conservation Act
WSA	water supply assessment