PLANT LEGEND

TALL TREES

36" & 48" BOX	CUPRESSUS MACROCARPA MONTEREY CYPRESS EVERGREEN TREE SIZE @ MATURITY: 40'X30-40' SIZE @ PLANTING: 8.5'X3' & 10'x4'	
36" & 48" BOX	METROSIDEROS EXCELSUS NEW ZEALAND CHRISTMAS TREE EVERGREEN TREE SIZE @ MATURITY: 30'X20' SIZE @ PLANTING: 10-12'X5-6' & 12-14'X7-8'	
35" BOX	PINUS TORREYANA TORREY PINE EVERGREEN TREE SIZE @ MATURITY: 40'-60'X30-50' SIZE @ PLANTING: 12'-14'X8'	

MID-SIZED TREES

24" BOX	EUCALYPTUS FICIFOLIA RED FLOWERING GUM EVERGREEN TREE SIZE @ MATURITY: H=18'-45' S=15'-60' SIZE @ PLANTING: 10-12'X3-4'
24" & 36" BOX	ARBUTUS MARINA (MULTI) ARBUTUS MARINA EVERGREEN TREE SIZE @ MATURITY: 40'X40' SIZE @ PLANTING: 4-6'X4'-5' & 6'-8'x5'-6'

LARGE SHRUBS

24" & 36" BOX	UMBELLULARIA CALIFORNICA CALIFORNIA BAY (SHRUB FORM) EVERGREEN TREE SIZE @ MATURITY: 20'X25-30' SIZE @ PLANTING: 8.5'X3' & 10'x4'
5 GAL	MYRICA CALIFORNICA CALIFORNIA WAX MYRTLE (TREE FORM) EVERGREEN TREE SIZE @ MATURITY: 10'-30'X10'-30' SIZE @ PLANTING: 3'X2'

MID-SIZED SHRUBS

5 GAL	RHUS INTEGRIFOLIA LEMONADE BERRY EVERGREEN SHRUB SIZE @ MATURITY: 8'X8' SIZE @ PLANTING: 2'x2'
5 GAL	MYRICA CALIFORNICA CALIFORNIA WAX MYRTLE (SHRUB FORM) EVERGREEN TREE SIZE @ MATURITY: 10'-30'X10'-30' SIZE @ PLANTING: 3'X2'
15 GAL & 24" BOX	HETEROMELES ARBUTIFOLIA TOYON, CHRISTMAS BERRY EVERGREEN SHRUB SIZE @ MATURITY: 8-10'X8-10' SIZE @ PLANTING: 1.5-2'X2' & 2.5-3'X3'

SMALL SHRUBS

1 GAL	ATRIPLEX LENTIFORMIS QUAILBUSH DECIDUOUS SHRUB SIZE @ MATURITY: 3'-10'X6'-12' SIZE @ PLANTING: 6"X6"
1 GAL	ENCELIA CALIFORNICA CALIFORNIA BRITTLEBUSH DECIDUOUS SHRUB SIZE @ MATURITY: 3'X4' SIZE @ PLANTING: 8"-12"X6"
1 GAL	ERIOPHYLLUM CONFERTIFLORUM PERENNIAL SIZE @ MATURITY: 1-2' SIZE @ PLANTING: 6"

GROUND COVERS

NATIVE HYDROSEED MIX: THROUGHOUT BERM AREA
ACHILLEA MILLEFOLIUM - YARROW
FRAGARIA CHILOENSIS - SAND STRAWBERRY
POTENTILLA ANSERINA SSP. PACIFICA - SILVER WEED CINQUEFOIL

NATIVE GRASS FOR BIOSWALE / BIOFILTER
DISTICLIS SPICATA - SALT GRASS

NATIVE GRASS SEED MIX:
DISTICLIS SPICATA - SALT GRASS
LEYMUS CONDENSATUS - GIANT RYE
LEYMUS TRITICOIDES - ALKAKI RYE
MUHLENBERGIA RIGENS - DEER GRASS
NASSELLA LEPIDA - FOOTHILL NEEDLEGRASS

TURF

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MANDALAY SITE

L1

RESOLUTION NO. 2007-19

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF OXNARD DENYING COASTAL DEVELOPMENT PERMIT (PZ 07-400-5) FOR A 45-MW ELECTRICAL GENERATING FACILITY LOCATED AT 251 NORTH HARBOR BOULEVARD, WITHIN THE COASTAL ZONE. FILED BY SOUTHERN CALIFORNIA EDISON, 2244 WALNUT GROVE AVENUE, ROSEMEAD, CA, 91770.

WHEREAS, the Planning Commission of the City of Oxnard considered the above-described application for a Southern California Edison 45-MW electrical power-generating facility and related equipment ("the project"); and

WHEREAS, the California Coastal Act defines a "Coastal-dependent development or use" as "...any development or use which requires a site on, or adjacent to, the sea to be able to function at all" (PRC §30101), and

WHEREAS, the project location is located in the Coastal Zone of the City Of Oxnard and subject to the Oxnard Coastal Land Use Plan and Chapter 17 (Coastal Zoning Ordinance) of the City Code; and

WHEREAS, the purpose of the Coastal Zoning Ordinance is stated in Section 17-2(2), "To assure priority for coastal-dependent and coastal-related development over other development on the coast"; and

WHEREAS, the coastal zone designation for the project site is Coastal Energy Facility Sub-Zone (EC); and

WHEREAS, Coastal Zoning Ordinance Section 17-20(B)(2) includes "Electrical power generating plant and accessory uses normally associated with said power generating facility" as a conditionally allowed use in the EC zone, requiring a coastal development permit; and

WHEREAS, there are no uses allowed in the EC zone other than by coastal development permit and the electrical power generating plant and accessory uses normally associated with said power generating facility use should be considered in the context of coastal-dependent; and

WHEREAS, a non-coastal dependent energy-generating facility would not be allowable based on Section 17-5(I) of the City Code which states, "If a proposed use is not listed as permitted or conditionally permitted, such use shall be assumed to be prohibited unless the city council determines, following recommendations from the commission and a public hearing, that the proposed use is substantially the same as a listed use."; and

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WHEREAS, the project was characterized by the applicant in letters dated April 19, 2007 and June 15, 2007 as "non-coastal dependent" and four identical projects are being developed in non-coastal locations.

NOW, THEREFORE, BE IT RESOLVED that the Planning Commission of the City of Oxnard finds that the proposed project is not an allowed use in the EC zone and denies the application for coastal development permit No. PZ 07-400-5.

PASSED AND ADOPTED by the Planning Commission of the City of Oxnard on the 28th day of June, 2007, by the following vote:

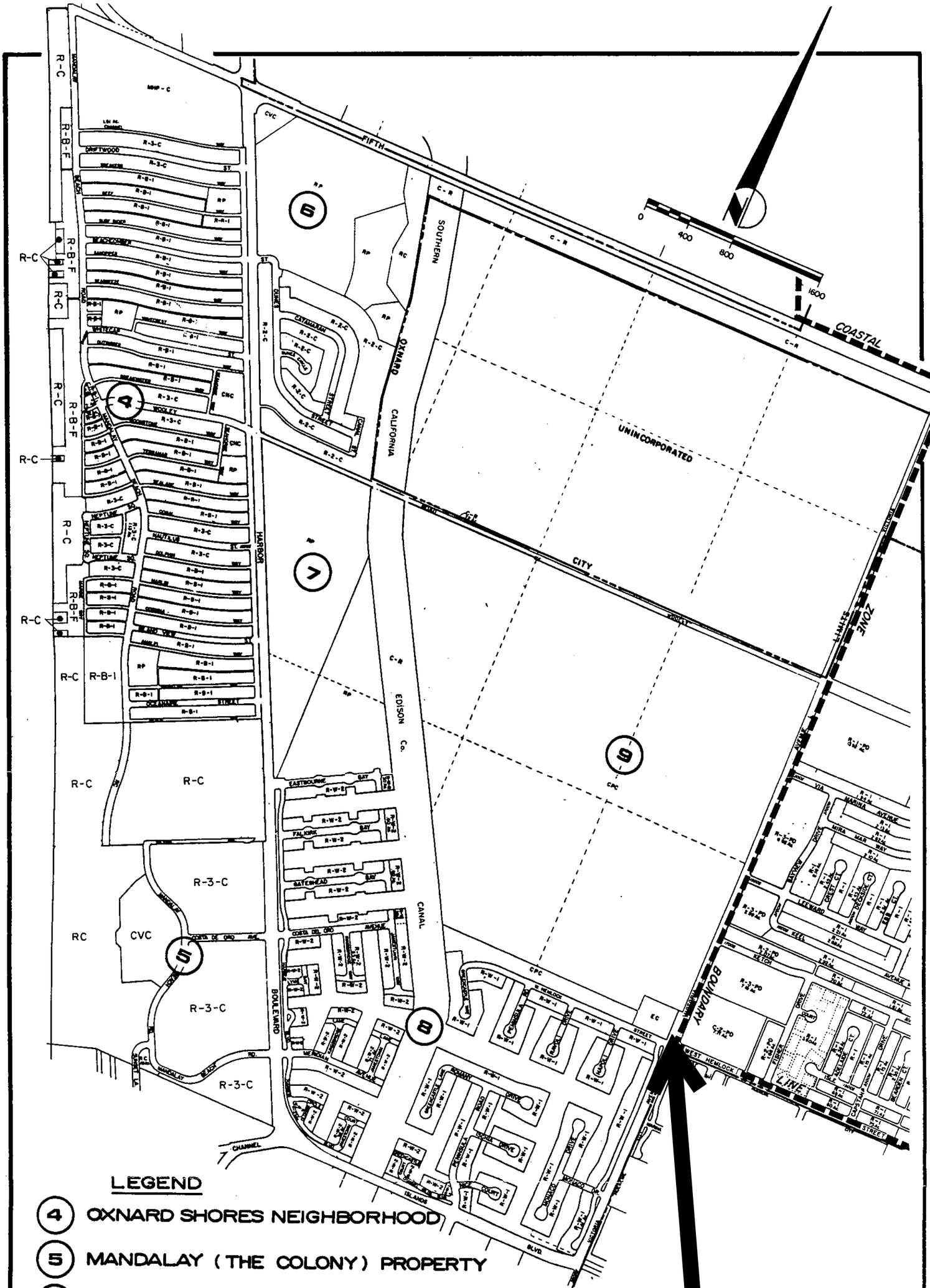
AYES: Commissioners: Medina, Sanchez, Elliott, Frank, Okada

NOES: Commissioners: Dean, Pinkard

ABSENT: Commissioners: None

_____
Dr. Sonny Okada, Chairperson

ATTEST: _____
Susan L. Martin, Secretary



LEGEND

4. OXNARD SHORES NEIGHBORHOOD
5. MANDALAY (THE COLONY) PROPERTY
6. NORTHERN DUNES AREA
7. SOUTHERN DUNES AREA
8. INLAND WATERWAY NEIGHBORHOOD
9. MANDALAY BAY PHASE IV SPECIFIC PLAN

Non-Coastal
EC Sub-zone

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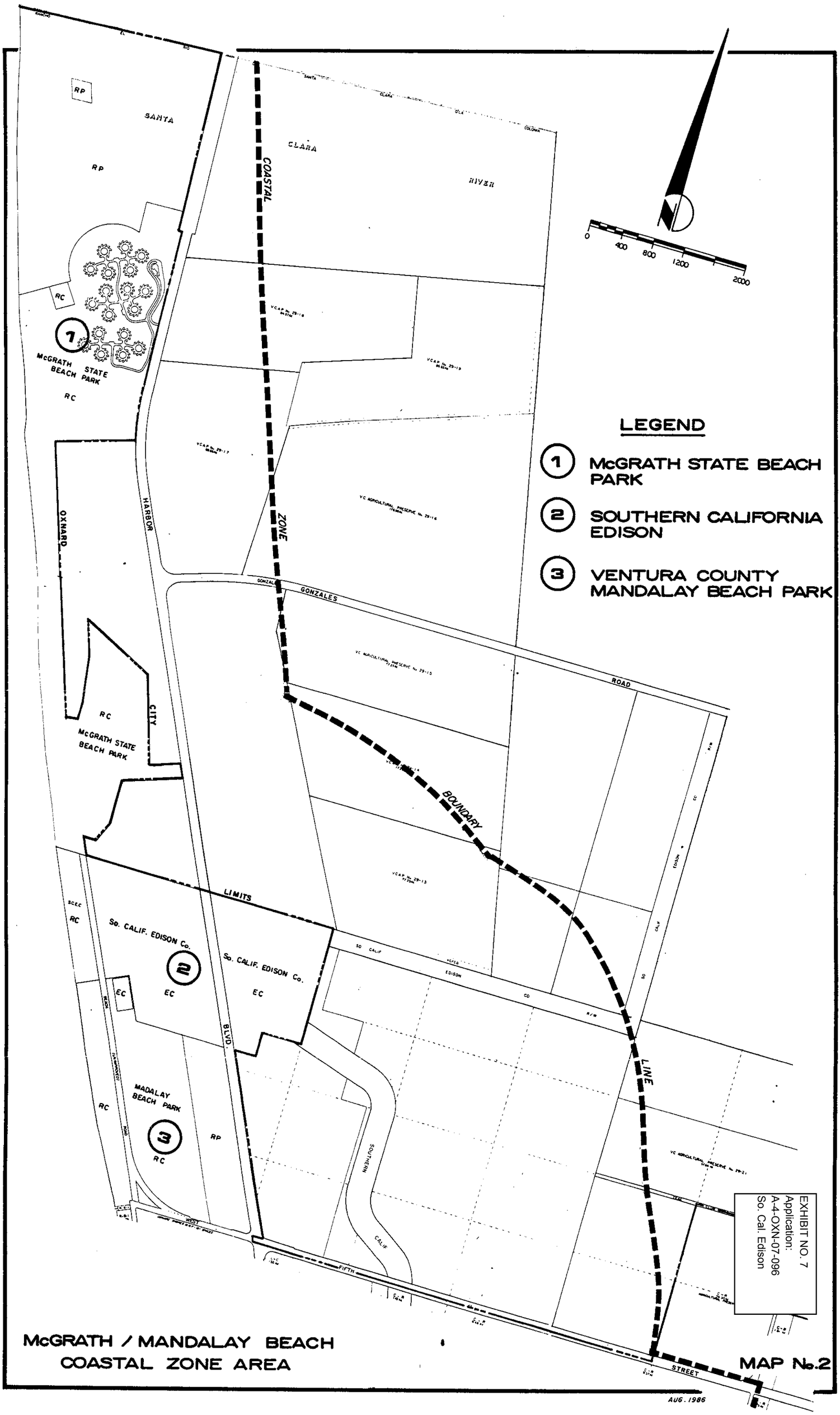
OXNARD SHORES
COASTAL ZONE AREA

MAP No. 3

MAY 1990



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PLANNING DIVISION
305 WEST THIRD STREET
OXNARD, CALIFORNIA 93030

MITIGATED NEGATIVE DECLARATION NO. 07-02

On the basis of an initial study, and in accordance with Section 15070 of the California Code of Regulations, the Planning Division has determined that there is no substantial evidence that the proposed project may have a significant effect on the environment:

> Coastal Development Permit PZ 06-400-5, a request to develop a 45-Megawatt (MW) "peaker" generator located at 251 N. Harbor Boulevard, Oxnard, California. The project facilities will include one natural gas-fired General Electric (GE) LM6000 gas turbine generator, pollution control equipment including a selective catalytic reduction (SCR) system and an oxidation catalyst, an 80-foot tall exhaust stack, a 10,500-gallon 19-percent aqueous ammonia storage tank, fuel gas supply line, fuel gas compressor, water supply line, water demineralizer, two water storage tanks, transformers, 66 kilovolt (kV) transmission tap line, a natural gas-fired "black-start" generator that can be independently started, a power control module, a 65- by 75-foot customer substation, and a 40- by 75-foot gas metering station. Filed by Southern California Edison, 2244 Walnut Grove Avenue, Rosemead, CA 91770

Attached is a copy of the initial study documenting the reasons to support the finding of no significant effect on the environment. Mitigation measures are included in the initial study to reduce the identified potential effects to a less than significant level:

• Aesthetics • Air Quality • Biological Resources • Cultural Resources • Geology and Soils • Hazards and Hazardous Materials • Hydrology and Water Quality	• Land Use and Planning • Mineral Resources • Noise • Population/housing • Recreation • Transportation/Traffic • Utilities/Service Systems

Mitigations are summarized on the following pages.

Attachments: Initial Study/MND 07-02
Appendices A to G

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SUMMARY OF MITIGATION MEASURES INCORPORATED INTO THE PROJECT

Topic Area	Mitigation Measures	
Aesthetics		None
Agricultural Resources		None
Air Quality	**AQ-1**	The area disturbed by clearing, grading, earth moving, or excavation operations shall be minimized to prevent excessive amounts of dust.
	AQ-2	Pre-grading/excavation activities shall include watering the area to be graded or excavated before commencement of grading or excavation operations. Application of water (preferably reclaimed, if available) should penetrate sufficiently to minimize fugitive dust during grading activities.
	AQ-3	Fugitive dust produced during grading, excavation, and construction activities shall be controlled by the following activities: a) If soil is hauled off site, all haul trucks shall be required to cover their loads as required by California Vehicle Code §23114. b) All graded and excavated material, exposed soil areas, and active portions of the construction site, including unpaved on-site roadways, shall be treated to prevent fugitive dust. Treatment shall include, but not necessarily be limited to, periodic watering, application of environmentally-safe soil stabilization materials, and/or roll-compaction as appropriate. Watering shall be done as often as necessary and reclaimed water shall be used whenever possible.
	AQ-4	Graded and/or excavated inactive areas of the construction site shall be monitored by SCE's construction contractor at least weekly for dust stabilization. Soil stabilization methods, such as water and roll-compaction, and environmentally-safe dust control materials, shall be periodically applied to portions of the construction site that are inactive for over four days. If no further grading or excavation operations are planned for the area, the area should be seeded and watered until grass growth is evident, or periodically treated with environmentally-safe dust suppressants, to prevent excessive fugitive dust.
	AQ-5	Signs shall be posted on-site limiting traffic to 15 miles per hour or less.

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SUMMARY OF MITIGATION MEASURES INCORPORATED INTO THE PROJECT

Topic Area	Mitigation Measures	
	AQ-6	During periods of high winds (i.e., wind speed sufficient to cause fugitive dust to impact adjacent properties), all clearing, grading, earth moving, and excavation operations shall be curtailed to the degree necessary to prevent fugitive dust created by on-site activities and operations from being a nuisance or hazard, either off-site or on-site. The site superintendent/supervisor shall use his/her discretion in conjunction with the APCD in determining when winds are excessive.
	AQ-7	Adjacent streets and roads shall be swept at least once per day, preferably at the end of the day, if visible soil material is carried over to adjacent streets and roads.
	AQ-8	Personnel involved in grading operations, including contractors and subcontractors, should be advised to wear respiratory protection in accordance with California Division of Occupational Safety and Health regulations.
	AQ-9	Equipment idling time shall be minimized.
	AQ-10	Equipment engines shall be maintained in good condition and in proper tune as per manufacturers' specifications.
	AQ-11	Alternatively fueled construction equipment, such as compressed natural gas (CNG), liquefied natural gas (LNG), electric, or equipment meeting Tier 2 standards, shall be used if feasible.
Biological Resources	- Not Applicable -	

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SUMMARY OF MITIGATION MEASURES INCORPORATED INTO THE PROJECT

Topic Area	Mitigation Measures	
	- Not Applicable -	
	BIO-3	A qualified biologist will conduct a pre-construction survey of each construction area to identify occupied nests of native birds prior to grubbing or grading activity. If occupied nests of native birds are observed within the construction zone, a minimum buffer of 100 feet will be established between the nest and limits of construction. Additionally, the construction crew will avoid activities within the buffer zone until the bird nest(s) is/are no longer occupied, per a subsequent survey by the qualified biologist. If work within the established 100 foot buffer cannot be avoided, consultation with the U.S. Fish and Wildlife Service and California Department of Fish and Game will be conducted to determine if there are appropriate measures that may be taken to continue work in these areas.
Cultural Resources	**CUL - 1**	Developer shall contract with a Native American monitor to be present during all subsurface grading, trenching or construction activities on the project site. The monitor shall provide a final report to the Planning Division summarizing the activities during the reporting period. A copy of the contract for these services shall be submitted to the Planning Division Manager for review and approval prior to issuance of any grading permits. The monitoring report(s) shall be provided to the Planning Division prior to approval of final building permit signature.
Geology and Soils		None
Hazards & Hazardous Materials	**HM - 1**	During construction, hazardous materials stored on-site will be limited to small quantities of paint, coatings and adhesive materials, and emergency refueling containers. These materials will be stored in their original containers inside a flammable materials cabinet. Fuels, lubricants, and various other liquids needed for operation of construction equipment will be transported to the construction [illegible] an as-needed basis by equipment service trucks.

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SUMMARY OF MITIGATION MEASURES INCORPORATED INTO THE PROJECT

Topic Area	Mitigation Measures	
Hydrology/Water Quality	None	
Land Use/Planning	- Not Applicable -	
Mineral Resources	None	
Noise		
Population/Housing	None	
Public Services	None	
Recreation	None	
Transportation/Traffic	**TT-1**	Should a temporary road and/or lane closure be necessary during construction the contractor will provide traffic control activities and personnel, as necessary, to minimize traffic impacts. This may include scheduling deliveries for off-peak hours and providing escorts for oversized loads, detour signage, cones, construction area signage, flagmen and other measures, as required, for safe traffic handling in the construction zone.

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SUMMARY OF MITIGATION MEASURES INCORPORATED INTO THE PROJECT

Topic Area	Mitigation Measures
	TT-2 Traffic Control Plan. A traffic control plan for the natural gas pipeline construction will be prepared by a registered traffic control engineer. The details of the traffic control plan will be prepared and approved by the affected jurisdictions. The Traffic Control Plan will generally follow the standard set forth by Caltrans. The Traffic Control Plan shall be submitted to the City for approval and will contain the following elements: • Designate required traffic patterns or temporary road closures for construction; • Provide construction work zone signs; • Provide safety measures to separate motorists from the construction workers and the work zone; In addition to the traffic control plan, the construction methodology along the roadways will: • Ensure access for emergency vehicles at all times; • Open lanes as soon as possible to restore normal traffic patterns; • Notify the public during construction, using methods such as large electronic notification and arrow signs, notification to impacted residents, appropriate detour signs, and notifications to schools and emergency providers; • Provide a designated traffic control coordinator to ensure compliance with the Traffic Control Plan; • During construction, cover open trenches within 15 feet of the edge of the pavement with metal plates at the end of the work day; and • After construction, restore the road to its pre-construction condition.
Utilities/Service Systems	None

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SECTION 2 BURROWING OWL MITIGATION GUIDELINES

The objective of these mitigation guidelines is to minimize impacts to burrowing owls and the resources that support viable owl populations. These guidelines are intended to provide a decision-making process that should be implemented wherever there is potential for an action or project to adversely affect burrowing owls or their resources. The process begins with a four-step survey protocol (see *Burrowing Owl Survey Protocol)* to document the presence of burrowing owl habitat, and evaluate burrowing owl use of the project site and a surrounding buffer zone. When surveys confirm occupied habitat, the mitigation measures described below are followed to minimize impacts to burrowing owls, their burrows and foraging habitat on the site. These guidelines emphasize maintaining burrowing owls and their resources in place rather than minimizing impacts through displacement of owls to an alternate site.

Mitigation actions should be carried out prior to the burrowing owl breeding season, generally from February 1 through August 31 (Thomsen 1971, Zarn 1974). The timing of nesting activity may vary with latitude and climatic conditions. Project sites and buffer zones with suitable habitat should be resurveyed to ensure no burrowing owls have occupied them in the interim period between the initial surveys and ground disturbing activity. Repeat surveys should be conducted not more than 30 days prior to initial ground disturbing activity.

DEFINITION OF IMPACTS

1. Disturbance or harassment within 50 meters (approx. 160 ft.) of occupied burrows.

2. Destruction of burrows and burrow entrances. Burrows include structures such as culverts, concrete slabs and debris piles that provide shelter to burrowing owls.

3. Degradation of foraging habitat adjacent to occupied burrows.

GENERAL CONSIDERATIONS

1. Occupied burrows should not be disturbed during the nesting season, from February 1 through August 31, unless the Department of Fish and Game verifies that the birds have not begun egg-laying and incubation or that the juveniles from those burrows are foraging independently and capable of independent survival at an earlier date.

2. A minimum of 6.5 acres of foraging habitat, calculated on a 100-m (approx. 300 ft.) foraging radius around the natal burrow, should be maintained per pair (or unpaired resident single bird) contiguous with burrows occupied within the last three years (Rich 1984, Feeney 1992). Ideally, foraging habitat should be retained in a long-term conservation easement.

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3. When destruction of occupied burrows is unavoidable, burrows should be enhanced (enlarged or cleared of debris) or created (by installing artificial burrows) in a ratio of 1:1 in adjacent suitable habitat that is contiguous with the foraging habitat of the affected owls.

4. If owls must be moved away from the disturbance area, passive relocation (see below) is preferable to trapping. A time period of at least one week is recommended to allow the owls to move and acclimate to alternate burrows.

5. The mitigation committee recommends monitoring the success of mitigation programs as required in Assembly Bill 3180. A monitoring plan should include mitigation success criteria and an annual report should be submitted to the California Department of Fish and Game.

AVOIDANCE

Avoid Occupied Burrows

No disturbance should occur within 50 m (approx. 160 ft.) of occupied burrows during the non-breeding Season of September 1 through January 31 or within 75 m (approx. 250 ft.) during the breeding Season of February 1 through August 31. Avoidance also requires that a minimum of 6.5 acres of foraging habitat be preserved contiguous with occupied burrow sites for each pair of breeding burrowing owls (with or without dependent young) or single unpaired resident bird (Figure 2).

MITIGATION FOR UNAVOIDABLE IMPACTS

On-site Mitigation

On-site passive relocation should be implemented if the above avoidance requirements cannot be met. Passive relocation is defined as encouraging owls to move from occupied burrows to alternate natural or artificial burrows that are beyond 50 m from the impact zone and that are within or contiguous to a minimum of 6.5 acres of foraging habitat for each pair of relocated owls (Figure 3). Relocation of owls should only be implemented during the non-breeding season. On-site habitat should be preserved in a conservation easement and managed to promote burrowing owl use of the site.

Owls should be excluded from burrows in the immediate impact zone and within a 50 m (approx. 160 ft.) buffer zone by installing one-way doors in burrow entrances: One-way doors should be left in place 48 hours to insure owls have left the burrow before excavation. One alternate natural or artificial burrow should be provided for each burrow that will be excavated in the project impact zone. The project area should be monitored daily for one week to confirm owl use of alternate burrows before excavating burrows in the immediate impact zone. Whenever possible, burrows should be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe or burlap bags should be inserted into the tunnels

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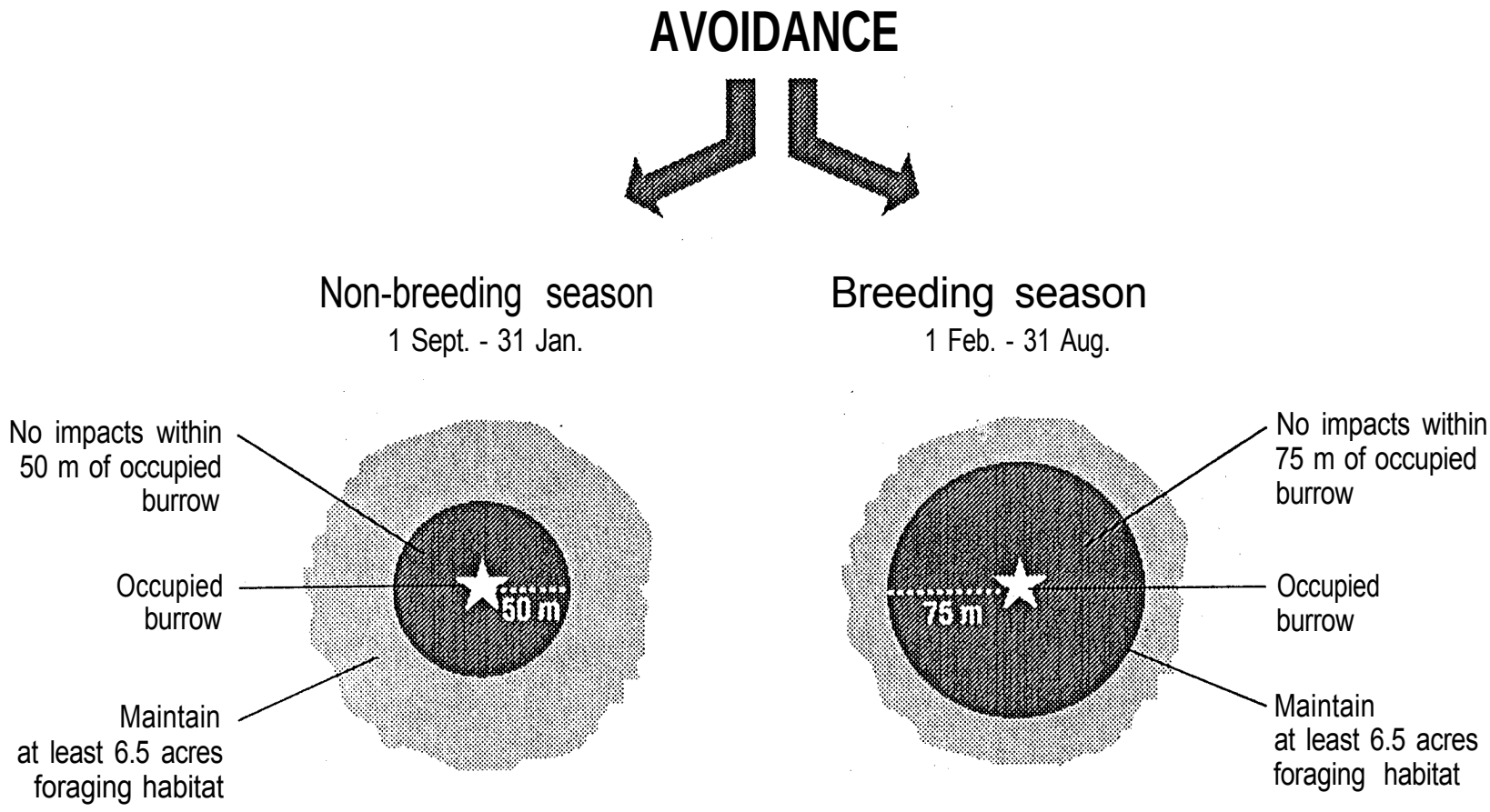

Figure 2. Burrowing owl mitigation guidelines.

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ON-SITE MITIGATION
IF AVOIDANCE NOT MET

(More than 6.5 acres suitable habitat available)

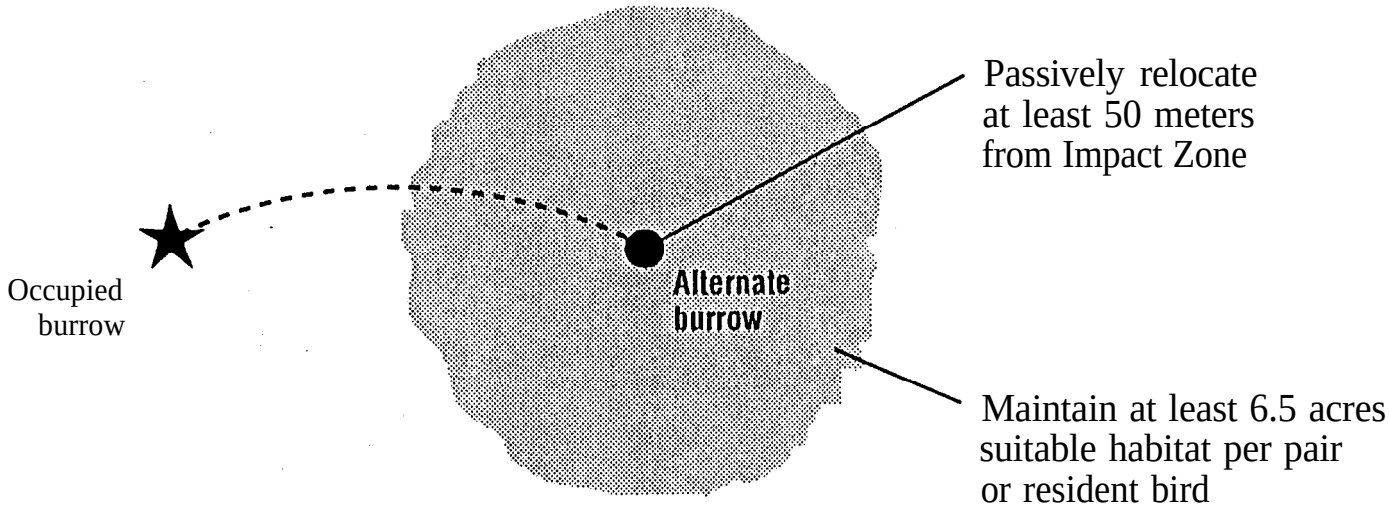

Figure 3. Burrowing owl mitigation guidelines.

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during excavation to maintain an escape route for any animals inside the burrow.

Off-site Mitigation

If the project will reduce suitable habitat on-site below the threshold level of 6.5 acres per relocated pair or single bird, the habitat should be replaced off-site. Off-site habitat must be suitable burrowing owl habitat, as defined in the *Burrowing Owl Survey Protocol*, and the site approved by CDFG. Land should be purchased and/or placed in a conservation easement in perpetuity and managed to maintain suitable habitat. Off-site mitigation should use one of the following ratios:

1. Replacement of occupied habitat with occupied habitat: 1.5 times 6.5 (9.75) acres per pair or single bird.

2. Replacement of occupied habitat with habitat contiguous to currently occupied habitat: 2 times 6.5 (13.0) acres per pair or single bird.

3. Replacement of occupied habitat with suitable unoccupied habitat: 3 times 6.5 (19.5) acres per pair or single bird.

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McGrath Beach Peaker Project
Greenhouse Gas Emission Discussion

During the environmental review of the McGrath Beach peaker project, members of the public requested additional information on how the project might impact global climate change and what steps Southern California Edison (SCE) intended to take to mitigate those impacts. This white paper discusses the McGrath Beach peaker's greenhouse gas (GHG) emissions in the context of the overall regulatory structure governing SCE's GHG emissions and their planned reduction to meet California's GHG emission targets.

1. Scientific Background

SCE considers global warming to be an important issue and is committed to ensuring that the potential GHG emission impacts from its generation portfolio, including existing generation, new utility generation, new third-party generation built to satisfy SCE power procurement solicitations, and purchased generation from long- and short-term power contracts, are adequately addressed.

Global warming is particularly important to the coastal zone because California possesses significant habitat, marine life, and development assets within this zone that would be adversely affected if temperatures were to increase significantly or sea levels were to rise. The proposed McGrath Beach project is itself located at 10 feet above sea level and could be adversely impacted if global warming were to result in a rise in sea level.

Scientific research attributes global warming primarily to GHG emissions that remain in the atmosphere for many decades and trap heat, thereby resulting in warming of the global atmosphere. GHG emissions that contribute to global warming include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (NO), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (SF_6).

In 2004, total worldwide GHG emissions were estimated to be 20,135 Million Metric Tonnes[1] of Carbon Dioxide Equivalents[2] ($MMTCO_2E$).[3] For comparison, in 2004, U.S. GHG emissions were 7,074 $MMTCO_2E$,[4] of which California produced 492 $MMTCO_2E$, making it the state with the second largest GHG emissions contribution in that year.[5] If

[1] 1 million metric tonnes (MMT) = 1 teragram (Tg) = 1.102 million U.S. ("short") tons
[2] When quantifying GHG emissions, the different global warming potentials (GWP) of the various greenhouse gases are usually taken into account by normalizing their rates into an equivalent CO2 emission rate. Carbon dioxide equivalent emissions (CO_2 Eq, CO_2E *or* CO_2e) represents the amount of CO2 emissions that it would take to create a climate impact equivalent to the emissions of the specific gas or source of interest. This standardization is useful for comparison purposes, since the emissions impact of different source types and gases can then be directly compared.
[3] Association of Environmental Professionals. Final - June 29, 2007. M. Hendrix et. al. Alternative Approaches to Analyzing Greenhouse Gas Emissions and Global Climate Change in CEQA Documents. This estimate excludes emissions/removals from land use, land use change, & forestry.
[4] Ibid
[5] Ibid

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California were an independent nation, it would have ranked between 12th and 16th in total GHG emissions worldwide in 2004.[6,7]

California's largest source of GHG emissions is from transportation, which contributes 41% of the State's total GHG emissions. Electricity generation (including energy imports) is the second largest source, contributing 22%. Industry is the third largest source, contributing 20%.[8]

Out-of-state electricity generation has a significantly higher GHG emission rate than in-state generation, due to the higher percentage of coal-fired generation that is included in out-of-state imports. Although imported electricity comprises less than one-third of total retail sales, it produces approximately half of total GHG emissions. Since 1990, imported fossil fuel generation produced between 544 and 735 Metric Tonnes of CO_2E per gigawatt-hour (GWh) of electricity use, while in-state electricity generation (including zero emission sources) resulted in less than 280 metric tons of CO_2 per GWh , or only 35-40% of the CO_2 emissions for the same amount of energy production.[9]

Although California's total GHG emissions are large, the State's carbon intensity is comparatively low. In 2001, California ranked the fourth lowest among the 50 states and the District of Columbia in CO_2 emissions from fossil fuel combustion per capita, and fifth lowest in CO_2 emissions from fossil fuel combustion per unit of gross state product. This low intensity is attributable to a variety of factors, including the heavy dependence on natural gas as a generation fuel, the effectiveness of California's energy efficiency measures and the state's mandatory Renewable Portfolio Standards in reducing state greenhouse gas emissions.[10]

2. Regulatory Background

As a regulated utility, SCE has the obligation to provide electric service to all customers within its service territory. This means that SCE must supply a sufficient quantity of electricity each year to meet its customers' demands. This electricity can be provided either from utility-owned generation or from power purchase agreements with third party suppliers. The quantity of GHG emissions that are produced to serve customer demand is directly related to: 1) the number of megawatt hours (MWh) of electricity that SCE must provide; 2) the energy source used to generate the electricity; and 3) the efficiency of the generation unit.

Different types of energy sources emit different amounts of GHG per MWh of electricity generated. Nuclear, hydroelectric, and renewable resources such as wind or solar energy

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[6] California Energy Commission. December 2006. Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004. Staff Final Report. CEC-600-2006-013-SF.
[7] Since 2004, emissions from the expanding economies of the world (e.g., China and India) have outpaced emissions in the U.S. and the developed countries, substantially changing the proportional shares of global GHG emissions.
[8] Ibid
[9] Ibid
[10] Ibid

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produce no direct GHG emissions. Among fossil fuel energy sources, natural gas is the cleanest source, followed by fuel oil, with coal producing the most GHG emissions per MWh of generation. Within each of the three major fossil fuel categories, more efficient sources with lower heat rates (mmbtu/MWh) emit fewer greenhouse gasses than less efficient sources with higher heat rates. A lower heat rate means that less fuel (mmbtu) is combusted to produce the same amount of electricity (MWh). Because GHG emissions are directly proportional to the amount of fuel combusted, a more efficient source will produce less GHG per MWh than a less efficient source.

Consequently, in order to reduce GHG emissions from the electric industry, the near term focus is on influencing the above three variables: energy demand (MWh), energy source, and generation efficiency. Energy efficiency and demand response initiatives are used to reduce energy demand (MWh). Increasing the amount of energy being supplied from renewable and natural gas energy sources reduces the amount of energy that must be supplied from higher GHG emitting energy sources such as coal. Replacing aging, less efficient generating units with newer, more efficient units; siting generation closer to customers; and utilizing efficient combined heat and power resources (CHP) improves generation efficiency.

This focus is clearly reflected in the California Climate Action Team's March 2006 Report to the Governor and California Legislature which suggested that the following initiatives be implemented by the California Public Utilities Commission to reduce GHG emissions from the electric industry.

Public Utilities Commission GHG Emission Reduction Strategies[11]

Strategy	$MMTCO_2E$	
	2010	2020
• Accelerated Renewable Portfolio Std to 33% by 2020 (includes load-serving entities)	5	11
• California Solar Initiative	0.4	3
• Investor-Owned Utility (IOU) Energy Efficiency Programs (including LSEs)	4	8.8
• IOU Additional Energy Efficiency Programs/Demand Response	NA	6.3
• IOU Combined Heat and Power Initiative	1.1	4.4
• IOU Electricity Sector Carbon Policy	1.6	2.7
Total:	12.1	36.2

In addition, the California Energy Commission has been directed to increase building and consumer product efficiency standards that apply to SCE's customers, which will lead to further reductions in energy demand.

[11] State of California, Environmental Protection Agency, Climate Action Team. March 2006. Climate Action Team Report to Governor Schwarzenegger and the California Legislature.

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This focus is also reflected in the key climate change mitigation strategies that have been identified by the Intergovernmental Panel on Climate Change (IPCC) for the electricity industry. Key mitigation strategies for energy supply include the following:[12]

- **Mitigation technologies and practices currently commercially available:** Improved supply and distribution efficiency; fuel switching from coal to gas; nuclear power; renewable heat and power (hydropower, solar, wind, geothermal and bioenergy); combined heat and power; early applications of Carbon Dioxide Capture and Storage (CCS) (e.g. storage of removed CO_2 from natural gas).

- **Mitigation technologies and practices projected to be commercialized before 2030:** Carbon capture and storage for gas, biomass and coal-fired electricity generating facilities; advanced nuclear power; advanced renewable energy, including tidal and wave energy, concentrating solar, and solar photovoltaics.

The State of California and the California Public Utility Commission (CPUC) have adopted numerous GHG laws, regulations and policies that apply to the proposed project and to SCE's overall GHG emissions profile, power generation, and power procurement activities in order to address GHG emissions from electricity generation sources. The key requirements affecting SCE are as follows:

Governor's Executive Order S-3-05 – Establishes state GHG emission targets that call for a reduction of GHG emissions to 2000 levels by 2010; to 1990 levels by 2020; and to 80% below 1990 levels by 2050.

AB32 (The California Global Warming Solutions Act of 2006) – Requires the California Air Resources Board (CARB) to promulgate regulations to reach the 2020 goal of reducing total GHG emissions to 1990 levels.

Governor's Executive Order S-20-06 – Directs CARB to develop a program for reducing greenhouse gas emissions through emissions trading.

Western Climate Change Action Initiative – Commits CA, WA, OR, AZ & NM to develop a regional market-based program to reduce GHG emissions.

CPUC R.04-4-003 – Requires SCE to consider the implications of various GHG scenarios in its long term procurement plans (LTPPs) to ensure that state GHG goals are met.

CPUC D.04-12-048 – Requires SCE to employ a GHG adder when evaluating energy bids for contracts over five years in duration in order to ensure a preference for renewable and low GHG energy sources.

[12] Intergovernmental Panel on Climate Change. 2007. Lenny Bernstein, et. al. Fourth Assessment Report Climate Change 2007: Synthesis Report, Summary for Policymakers.

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CPUC R.06-02-013 – Extends the use of the GHG adder to include all contracts of 1 year or longer and requires any PUC Application for new fossil-fired generation to demonstrate how the resource fits into SCE's overall GHG reduction strategy.

SB 1368 – Prevents long term power purchase agreements with or investments in baseload power plants with GHG emissions in excess of those produced by a combined-cycle natural gas power plant. The CPUC has established this emission performance standard (EPS) as 1,100 lbs CO_2E/net MWh.

SB 1078 (CA Renewable Portfolio Standard (RPS) Program) – Requires 20% of all power used by Investor Owned Utility customers in California to be generated from renewable resources by 2010.

CEC Energy Action Plan II (2005) – Establishes a 33% renewable RPS target for 2020. The CPUC requires SCE to report on progress towards meeting the 33% goal.

CPUC D.06-12-033 – Implements the California Solar Initiative with the goal of installing 3,000 MW of new solar photovoltaic systems by 2017. SCE will administer this program within its service territory, with a goal of 805 MW to be installed.

CPUC D.03-06-032 – Requires SCE to pursue the goal of satisfying 5% of it peak load through price responsive demand response programs by 2007 and to expeditiously implement time-of-day pricing for all customers.

CPUC D.04-09-060 – Requires SCE to pursue the goal of achieving cumulative energy savings of 10,608 GWh[13] and 2,228 MW between 2004-2013.

CPUC D.07-10-032 – Reaffirms the energy efficiency goals established in D.04-09-060 and establishes a process to develop goals extending to 2020.

CPUC D.08-03-018 – Recommends that CARB establish a GHG cap-and-trade system for all entities supplying power to the California electricity grid, with at least some portion of the GHG emission allowances being auctioned.

The above requirements have been adopted to ensure that the power generated to meet SCE's customer load is:

- Produced with the lowest GHG emissions rate possible;
- Consistent with the Governor's GHG policy; and
- Supports the state's GHG emission reduction targets.

[13] 1 GWh = 1,000 MWh

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Meeting SCE's load under all circumstances, in particular as customer demand continues to increase over time, requires a mixture of different energy resources in different locations to ensure that the electric system functions smoothly and reliably. SCE's resource portfolio must be constructed carefully to ensure that SCE complies with the above regulations to minimize and continue to reduce its GHG emissions while still efficiently meeting customer energy requirements.

As one example, in order to increase the use of intermittent[14] renewable resources such as wind or solar in its portfolio, SCE must also increase its natural gas fired peaking resources so it is able to backstop and smooth the changing electrical output from these intermittent sources in order to ensure grid stability. Similarly, a certain number of fossil fuel fired "black start" generators of high reliability must be sited in key locations to ensure grid reliability in the event of system upsets. Larger fossil fuel generators must be located at strategic locations to provide grid voltage support and system inertia.

The State has given the California Air Resources Board (CARB) the lead role in implementing California's GHG emission reduction program with regards to CO_2 air emission limits.

> "It is the intent of the Legislature that the State Air Resources Board consult with the Public Utilities Commission in the development of emissions reduction measures, including limits on emissions of greenhouse gases applied to electricity and natural gas providers regulated by the Public Utilities Commission in order to ensure that electricity and natural gas providers are not required to meet duplicative or inconsistent regulatory requirements." *(Cal. Health & Safety Code §38501(g)*)

In order to achieve AB32's stated goal of reducing GHG emissions to 1990 levels by 2020, CARB is in the process of developing regulations for all major contributing source categories, including the electricity industry. The first step in this process, finalizing the 1990 statewide CO_2 emission inventory, was completed in December 2007. CARB will now use this inventory, the 2008 statewide CO_2 emission inventory, and CO_2 emission reports from individual major sources to determine the quantity of emission reductions that will be allocated to each contributing emission segment (transportation, electricity, manufacturing, etc.) and individual emission company or source, as well as setting forth the regulatory mechanisms by which these reductions will be implemented.

SCE has calculated and reported its systemwide CO_2 emissions, including emissions from both generated and purchased power, to the California Climate Action Registry every year since 2002.[15] The AB32 program that CARB is developing for the electricity sector will reduce CO_2 emissions on a systemwide basis in order to ensure that all emissions created to serve California's load are captured and that all generating sources, regardless

[14] Intermittent resources are those whose power output can fluctuate from moment to moment, for example by a change in wind speed or a cloud passing over the sun.
[15] Starting in 2009, CO2 emissions will be reported to CARB.

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of ownership or location, are being treated uniformly and equitably.[16] If generation sources are not treated uniformly, regulating CO_2 emissions in one location, for example natural gas plants located in California, can have the adverse effect of increasing CO_2 emissions from the system as a whole by making it more economic to import out-of-state electricity from higher emitting generation sources.

CARB is in the process of creating a Scoping Plan that contains specific policy scenarios for regulating the different source categories. In a recent decision (D.08-03-018), the CPUC provided input to CARB recommending that a cap-and-trade system be utilized to reduce greenhouse gases from the electricity sector, with sources being required to purchase at least a certain portion of credits. AB32 requires CARB to adopt implementing regulations by January 2012.

The net effect of the above regulations is that the GHG emissions from SCE's generation portfolio will be capped and will be required to be reduced as directed by CARB to meet the State's greenhouse gas reduction goals.

3. Project Emissions

Operational Emissions

Power Plant Emissions

The McGrath Beach peaker will emit greenhouse gases from the combustion of natural gas in its turbine and the emergency ("black start") generator. The principal greenhouse gases emitted from fossil fuel combustion are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (NO). The Ventura County Air Pollution Control District (VCAPCD) air permit for the project will limit combustion turbine operation to 2,121 hours per year, 1,881 operating hours plus 240 hours of start up and shut down periods. The emergency generator will only operate during routine testing and maintenance activities and if there is a system blackout on the local electric grid. Reliability testing activities will require a maximum of 50 operating hours per year. Therefore, the maximum potential to emit from the proposed project is **51,032.7 Metric Tonnes CO_2E** per year. If a 30-year project life is assumed, then the maximum potential to emit over the life of the project is 1,530,981 Metric Tonnes CO2e.

[16] Although the program that is being developed will address generation emissions on a systemwide basis, the responsibility for unit-specific emissions are expected to be assigned to the individual generators and power aggregators ("first sellers") that have direct control over the emissions output from each generation source.

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McGrath Beach Peaker CO_2 Equivalent Emissions

CO2	Annual Usage (hours)	Heat Input (MMBtu/hr)	Emission Factor (kg C / MMBtu)	Oxidation Factor	CO2 Annual Emissions (tonnes/yr)	CO2 Equivalent Annual Emissions (tonnes/yr)	Fuel
Turbine	2121	451.3	14.47	0.995	50532.30	50532.30	Natural Gas
IC Engine	50	6.43	14.47	0.995	16.97	16.97	Natural Gas
CH4	**Annual Usage (hours)**	**Heat Input (MMBtu/hr)**	**Emission Factor (kg / MMBtu)**		**CH4 Annual Emissions (tonnes/yr)**	**CO2 Equivalent Annual Emissions (tonnes/yr)**	**Fuel**
Turbine	2121	451.3	0.003901		3.73	78.42	Natural Gas
IC Engine	50	6.43	0.003901		0.0013	0.026	Natural Gas
N2O	**Annual Usage (hours)**	**Heat Input (MMBtu/hr)**	**Emission Factor (kg / MMBtu)**		**N2O Annual Emissions (tonnes/yr)**	**CO2 Equivalent Annual Emissions (tonnes/yr)**	**Fuel**
Turbine	2121	451.3	0.001361		1.30	403.86	Natural Gas
IC Engine	50	6.43	0.001361		0.00044	0.14	Natural Gas
Total Emissions (Annual CO2 Equivalent Metric Tonnes)						51032.72	

The McGrath Beach peaker plant is expected to operate only during periods of high electricity demand, to stabilize the transmission system when a high voltage transmission line or another source of generation unexpectedly goes off line, or during system emergencies. Consequently, actual emissions are expected to be substantially lower than the maximum potential to emit.

Because the project will require no more than 1-2 employee round trips per day and ammonia deliveries no more than four times per year, other operating emissions from the facility are insignificant.

Transmission Emissions

GHG emissions may also result from the sulfur hexafluoride (SF_6) used to insulate the transmission equipment that will be installed to connect the project to the electric grid. Although small in quantity, SF_6 emissions are important because they have an extremely high global warming potential. One ton of SF_6 emissions is equivalent to approximately

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23,900 tons of CO_2. Fugitive emissions of SF_6 can escape from gas-insulated equipment through the seals or during equipment installation, servicing, and disposal.

The McGrath Beach peaker will require the installation of one new SF_6-insulated circuit breaker at the customer substation that will be constructed just to the south of the generating unit. This circuit breaker will contain 52 pounds of SF_6. The leak rate for this equipment is guaranteed by the manufacturer to not to exceed 1 percent per year. Therefore, the maximum potential to emit of this circuit breaker will be 0.52 pounds of SF_6 per year, which is equivalent to **5.6 Metric Tonnes CO_2E** per year. The calculation spreadsheet is attached.

SCE utilizes industry best practices to manage and minimize its SF_6 emissions. Between 1999 and 2006, SCE reduced sulfur hexafluoride (SF_6) gas emissions from its electrical insulation equipment by 41 percent, while at the same time increasing its overall inventory of SF_6 containing equipment by 27 percent. SCE reports its SF_6 emissions annually to the U.S. Environmental Protection Agency under a voluntary Memorandum of Understanding. SCE also tracks and reports its SF_6 emissions to the State as part of its systemwide CO_2e emission total. These emissions will be addressed as part of CARB's overall AB32 regulatory program.

Construction Emissions

Direct Construction Emissions

GHG emissions from construction activities are primarily due to CO_2 emissions from on-site construction equipment and motor vehicle trips to and from the site. Emissions from construction activities were estimated from the types and operating times of construction equipment that would be used during construction, the number and length of daily on- and off-site motor vehicle truck trips required to deliver materials and supplies to and remove construction debris from the site, and the estimated number and length of worker commute trips. Specific calculation spreadsheets are attached.

Total CO_2 emissions from construction activities were estimated to be **618.0 Metric Tonnes CO_2E**.

CO_2 emissions from construction activities will be minimized to the extent possible by implementing air quality mitigation measures AQ-9 through AQ-12 from the Draft Initial Study prepared as part of the project's California Environmental Quality Act (CEQA) analysis.

Transmission Interconnection Emissions

In order to prepare the local distribution system for the installation of the McGrath Beach peaker, 32 existing circuit breakers were replaced during 2007. These included 28 circuit breakers at the Santa Clara substation, 1 circuit breaker at the Charmin substation, and 3 circuit breakers at the Levy substation. These circuit breakers were oil-insulated models that were scheduled to be replaced as part of SCE's planned transmission and distribu

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system expansion activities in the Oxnard area. However, their replacement was accelerated by one year to occur in 2007, so that the system would be ready to accommodate the additional generation from the Mandalay site.

If these emissions are included in the project total, the proposed project resulted in an additional one-time maximum potential emission increase of **180.4 Metric Tonnes CO_2E**.

4. Systemwide Emissions

Systemwide Power Plant Emissions

There is a basic difference between building a power plant and other types of development. New residential, commercial and industrial developments are also new electric customers that increase the MWh of electricity that must be provided by the electric system in order to meet their additional energy demands. New power plants do not change the demand for electricity; they merely respond to the existing system's demand for power. The same MWh of generation must be generated by power plants at some location to supply the amount of electricity SCE requires to serve its customers regardless of whether or not a specific generation project is constructed.

SCE uses the Ventyx Market Analytics and the Ventyx Planning and Risk models to simulate the operation of its electric system. These models calculate the CO_2 emissions from SCE's system as a whole based on its projected annual load profile and are currently used to comply with CPUC directives to evaluate the net CO_2 emissions from new energy projects and for other reporting requirements.

In order to investigate the emission impact of the proposed project on SCE's generation portfolio, SCE used the Ventyx Planning and Risk model to dispatch SCE's portfolio with and without the proposed McGrath Beach peaker to determine the net change in CO_2 emissions that would occur.

To estimate CO_2 emissions from the proposed project, SCE modeled 3 cases: 1) base case (no project); 2) economic dispatch (how the peaker is expected to run); and 3) maximum dispatch (peaker dispatched at the maximum allowable run time in the VCAPCD air permit). Emissions were calculated for each year between 2008-2020[17] and averaged to determine the average annual net change.

Generation resources are economically dispatched to meet demand based on their marginal cost.[18] This is called the loading order. The marginal cost is highly correlated with unit efficiency, which means that power plants almost always dispatch in the order of the most efficient to the least efficient heat rate (mmbtu/MW-hr) within its fuel category. This is because the marginal cost of generating electricity within each fuel

[17] Model inputs are only available through 2020

[18] Certain higher cost resources such as renewable resources are required to be dispatched first, pursuant to existing regulatory requirements.

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category (coal, natural gas, etc.) is almost always lower for units that burn less fuel per MWh of energy produced. Consequently, the peaker would only be expected to operate when it is the most efficient resource available (lowest heat rate/least cost) to produce the next required MWh of electricity.

Because the marginal cost of natural gas fired peakers is high compared to other resources, they dispatch last in the loading order after all other available resources have been brought on line. Therefore, when the proposed peaker project is dispatched, it will almost always replace a higher emitting natural gas fired unit. Because all natural gas peakers are reasonably efficient, the relative difference in CO_2 emissions between the proposed peaker and the less efficient units would be expected to be small. This means that the net decrease in annual CO_2 emissions would also be expected to be small. This is consistent with the results of the model runs.

The economic dispatch scenario operated the peaker only when it would be cost effective to do so, which is the scenario that most closely estimates the actual operation of the unit. This scenario resulted in an average annual hourly operation of 93 hours and produced a net systemwide emissions decrease of **18 Metric Tonnes CO_2E** per year. This result mean that the direct emission increases from the peaker (which would be approximately 2,496 Metric Tonnes CO2e per year for 93 hours of operation) are completely offset by emission decreases at other power plants on the system, and will in fact produce a slight net emissions decrease.

The maximum dispatch scenario required the peaker to run for the full 2,121 hours (1,881 operating hours and 240 hours of startup/shutdown) allowed each year. This required running the unit when it was not economic to do so and when the peaker was not the most efficient available resource. This scenario produced a net systemwide emissions increase of **23 Metric Tonnes CO_2E**. This result means that the direct emission increases from the peaker (i.e., the 51,038 Metric Tonnes CO2e per year increase calculated above) were almost completely offset by emission decreases at other power plants on the system.

The variation in the two runs is less than +/- 0.05% of the gross project emissions of 51,032.7 Metric Tonnes CO_2E. Therefore, considering the uncertainties inherent in the model, neither of the two scenarios produces results significantly different than zero. This indicates that the emission impact of the proposed project is neutral and the addition of the proposed peaker does not increase CO_2 emissions from the SCE system.

Indirect Line Loss Emissions

In addition to its direct impact on the emissions of other generation sources supplying power to the electric grid, the location of a new generation source will also affect systemwide emissions based on how it impacts the path and distance that power must travel to reach the customer.

When electricity travels across the wires of the transmission system it creates friction. This friction in turn creates waste heat that results in a measurable energy loss. This

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energy loss, called line loss, occurs both due to the distance that power must travel from its source to its destination, and due to differences in the materials that are used in different types of electric conductors across which the power must flow. If the path that the electricity must follow has higher friction, then there will be a greater line loss, which means that more generation will be required to serve the same load. The amount of electricity that must be generated to serve the load is equal to the MWh of customer demand plus the MWh that is required to transport the electricity across the system. Lower line losses mean that less electricity must be generated to deliver the same amount of electricity. In general, the farther that a generation source is from the customer that is being served, the more electricity will be lost to line losses and the more generation will be required to serve an identical load.

When a new generation source is added to the SCE electric system, it changes both the path and the distance that electricity must travel to reach the customer. In order to determine the line loss impact of the proposed project on SCE's generation portfolio, SCE used the GE Positive Sequence Load Flow (PSLF) program to simulate transmission line power flows with and without the proposed McGrath Beach Peaker. An adjusted load forecast for the Santa Clara 66kV sub-transmission system was created for the year 2009 for both the expected dispatch scenario (93 operating hours) and the maximum potential dispatch scenario (1881 operating hours) using the Ventyx model load profile output for the peaker. The GE PSLF program was then run using these two load forecasts and the historic load profile for this system, to generate the average system line losses for each scenario (i.e. 93 hours and 1881 hours respectively).

Using 2009 to calculate line loss impact is a conservative approach because line loss benefits increase when more demand is placed on the electric system. Demand on the Santa Clara sub-transmission is growing at the rate of 2-3% per year; therefore the line loss benefits of the proposed peaker will increase every year.

The GE PSLF model calculated that the economic dispatch scenario (93 hours) reduced lines losses in the Santa Clara system by 17.4 MWh per year. The maximum dispatch scenario (1881 hours) reduced line losses by 231.7 MWh per year

To determine the avoided CO_2 emissions from this generation reduction, the following formula is used:

Metric Tonnes CO_2E Reduced = MWh * HR * ER * 4.537E-07 [19]

Where

MWh = Megawatt-hours of avoided generation

HR = Heat rate of the generating unit being displaced in btu/kWh

ER = Emission rate of the generating unit being displaced in lbs CO_2/mmbtu

[19] 4.54 E-07 = 10^3 kW/MW * 10-6 mmbtu/btu ÷ 2204 lbs/metric tonne

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Because the new peaker will displace similar natural gas peakers during the hours that it will operate, a conservative heat rate of 8,500 btu/kW and 119 lbs CO_2/mmbtu emission rate were assumed for the incremental operating unit.

The CO_2 reduction is therefore calculated as follows:

Metric Tonnes of CO_2E Reduced = 17.4 MWh * 8,500 btu/kWh * 119 lbs CO_2/mmbtu * 4.537E-07

= 8.0 Metric Tonnes of CO_2E

Therefore, the economic dispatch scenario reduces systemwide CO_2 emissions by **8.0 Metric Tonnes CO_2E** per year due to the reduction in line losses. Using a similar calculation, the maximum dispatch scenario reduces systemwide CO_2 emissions by **106.3 Metric Tonnes CO_2E** per year. Assuming a project life of 30-years, the total line loss benefit of the peaker is a reduction of 240 Metric Tonnes of CO_2E for the economic dispatch scenario and 3,189 Metric Tonnes of CO_2E for the maximum dispatch scenario.

Additional Systemwide Benefits

One key benefit of the proposed project is its ability to supply power in the event of a system upset that requires "black start" capability. Under a blackout scenario, the peaker would be able to supply 45 MW of emergency power to the local grid almost immediately and would assist the regional electrical grid in coming back on line as quickly as possible, thereby reducing recovery time.

During blackout situations, many sources operate diesel-fired backup emergency generators. These generators have higher CO_2 emission rates than the proposed project. Therefore, the generator emissions that are avoided due to the interim power being supplied by the peaker and the overall faster recovery time of the regional grid will provide additional GHG benefits.

Energy Efficiency Measures Incorporated into Project Design

Energy efficiency measures have been incorporated into the project's design to the extent feasible. The proposed project has been designed to meet California Energy Commission energy efficiency standards for outdoor lighting and incorporates automatic cut off switches and multi level switching as required to allow best practice management of lighting levels. The significant use of California native vegetation in the landscape design also minimizes the amount of water required to irrigate the project, compared to a design consisting primarily of ornamental species. These measures will also reduce the indirect CO_2 emissions from the proposed project.

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5. Net Emissions

To determine the net GHG emissions from the proposed peaker, operational, construction and systemwide emissions impacts (increases and/or decreases) are added together.

Lifetime emissions were calculated assuming a 30-year project life. For the maximum potential generation scenario, the proposed project results in an overall **2,223 Metric Tonnes CO_2E** decrease over the life of the project, primarily due to the line loss benefits created by the project.

McGrath Peaker Net CO_2E Emission Impact
Maximum Potential Dispatch Scenario

Operational Emissions	*Metric Tonnes of CO_2E*
Power Plant	1,530,981
Transmission System	168
Construction Emissions	
Direct Construction	180
Transmission Interconnection	618
Systemwide Emissions	
Power Plant	-1,530,981
Transmission System	-3,189
Total:	**-2,223**

If the project operates for fewer hours, as predicted by the economic dispatch scenario, line loss benefits will be reduced, and the proposed project results in a net increase of **726 Metric Tonnes CO_2E** over the life of the project. Actual dispatch hours and emissions will likely fall somewhere in between the two scenarios.

Either result is less than +/- 0.1% of the proposed project's maximum potential to emit of 1,531,149 Million Metric Tonnes CO_2E and should be considered de minimus for a project of this size.

McGrath Peaker Net CO_2E Emission Impact
Economic Dispatch Scenario

Operational Emissions	*Metric Tonnes of CO_2E*
Power Plant	74,881
Transmission System	168
Construction Emissions	
Direct Construction	180
Transmission Interconnection	618
Systemwide Emissions	
Power Plant	-74,881
Transmission System	-240
Total:	**726**

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6. Summary

SCE's electric system is subject to a significant number of complex requirements that work together to regulate GHG emissions, including AB32 "The California Global Warming Solutions Act of 2006." These regulations are collectively designed to ensure that new sources generate electricity as cleanly as possible and that the SCE system continues to reduce its overall emissions as required to meet California's goal of reducing statewide CO2 emissions to 1990 levels by 2020. It is important that the proposed project is treated consistently with generators in other locations in the way it is required to comply with the above regulations.

The emission analysis for the proposed project shows that the installation of the McGrath Beach peaker will result in a slight net decrease in CO_2E emissions across SCE's generation portfolio due to its operation. Depending on the operating hour assumptions, these emission reductions may or may not fully offset the project's construction emissions. The maximum level of residual construction emissions is calculated to be 726 Metric Tonnes CO_2E which represents less than 0.1% of lifetime project emissions and would typically be considered de minimus.

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CONSTRUCTION EMISSION CALCULATIONS

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Construction Carbon Dioxide Emissions

Carbon dioxide (CO_2) emissions during construction of the Mandalay Peaker Project were estimated. The estimates included CO_2 emissions from construction equipment and from motor vehicles.

CO_2 emissions from construction equipment were calculated by multiplying operating hours for each type of construction equipment by an emission factor, in units of pounds of CO_2 emitted per operating hour. The construction equipment exhaust emission factors used for the calculations are composite horsepower-based off-road emission factors for 2007 developed for the South Coast Air Quality Management District (SCAQMD) by the California Air Resources Board (CARB) from its OFFROAD Model. The composite off-road emission factors were derived based on equipment category (tractor, dozer, scraper, etc.), and average equipment age and horsepower rating within horsepower ranges for the year. Although the proposed project will be constructed in Ventura County, emission factors for construction equipment in the SCAQMD's jurisdiction are expected to be similar to emission factors for equipment in adjacent Ventura County. The CO_2 emission factors developed by CARB for the SCAQMD for 2007 are listed in Table 5 of the attached spreadsheets and can also be downloaded from http://www.aqmd.gov/ceqa/handbook/offroad/offroad.html.

The types of construction equipment and the maximum daily operating time for each type of equipment during each bi-weekly construction period were estimated by SCE's engineering contractor for the proposed projects. Emission factors for CO_2 were prepared for the specified equipment and are provided in Table 4 of the attachment. The anticipated construction equipment usage and emissions by bi-weekly period are listed in Tables 1, 2 and 3 of the attachment. Total CO_2 emissions from construction equipment are estimated to be 571.4 U.S. Tons (518.5 Metric Tonnes).

CO_2 emissions from motor vehicles were calculated by multiplying miles traveled by each type of motor vehicle by an emission factor, in units of pounds of CO_2 emitted per mile traveled. The emission factors were compiled by the SCAQMD by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model for the South Coast Air Basin for 2007. A weighted average of vehicle types was used to calculate emission factors for passenger vehicles, and emission factors for heavy heavy-duty diesel trucks were used for delivery trucks. The emission factors account for the emissions from start, running and idling exhaust. Emission factors for motor vehicles in the South Coast Air basin are expected to be similar to emission factors for vehicles in adjacent Ventura County. The motor vehicle exhaust CO_2 emission factors are listed in Table 6 of the attachment and can also be downloaded from http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html.

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SCE's engineering contractor estimated the number and length of daily on-site and off-site motor vehicle trips by trucks to deliver materials and supplies, remove construction debris, etc., by bi-weekly construction period. The anticipated number of construction workers during each bi-weekly construction period was used to calculate the number of construction worker commute trips, assuming each worker would drive separately to and from the site each day. This assumption overestimates the number of trips, since it is likely that some workers will carpool.

The anticipated number of motor vehicles and the resulting CO_2 emissions by bi-weekly period are listed in Tables 1, 2 and 3 of the attachment. Total CO_2 emissions from motor vehicles are estimated to be 109.6 U.S. Tons (99.5 Metric Tonnes).

Total CO_2 emissions during construction are estimated to be 681.0 U.S. Tons (618.0 Metric Tonnes).

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SF_6 EMISSION CALCULATIONS

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Table 1
Mandalay Construction Equipment and Motor Vehicle Numbers

Equipment/Vehicle Type	Fuel	Hours or Miles/Day	Bi-Weekly Maximum Daily Number											
			Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8	Period 9	Period 10	Period 11	Period 12
Power Plant														
Construction Equipment														
Welding rigs	D	10	2	2	2	2	2	2	2	2	2	1	1	0
Backhoe	D	10	1	2	2	2	2	2	1	1	1	1	0	0
Compressor	D	10	1	2	4	4	4	3	2	2	0	0	0	0
Front-end loader	D	10	0	1	1	1	1	1	1	1	0	0	0	0
15 ton crane	D	10	0	1	1	3	3	3	2	2	2	1	1	1
75 ton crane	D	10	0	0	0	1	1	1	1	1	1	0	0	0
Generator	D	10	2	2	2	2	1	1	1	1	0	0	0	0
Scraper	D	10	1	1	1	1	1	1	1	0	0	0	0	0
Forklift	D	10	2	3	3	3	3	2	2	2	2	1	1	1
Manlift	D	10	2	2	2	2	1	1	1	0	0	0	0	0
Dewatering drill rig	D	1.25	1	1	1	0	0	0	0	0	0	0	0	0
Motor Vehicles														
On-Site Pickup Truck	G	25	1	2	2	3	3	2	2	2	1	2	3	4
On-Site Construction Worker Commute	G	0.5	6	22	30	38	36	24	24	16	4	4	4	4
On-Site Water Truck	D	20	1	1	1	1	1	1	1	1	1	1	0	0
Off-Site Dump Truck	D	50	1	2	2	1	1	0	0	0	0	0	0	0
Off-Site Concrete Truck	D	50	0	5	5	0	0	0	0	0	0	0	0	0
Off-Site Delivery Truck	D	50	0	1	1	1	1	1	1	1	0	0	0	0
Off-Site Construction Worker Commute	G	35	6	22	30	38	36	24	24	16	4	4	4	4
Gas Line														
Construction Equipment														
Gas Line Welding rigs	D	6	4	4	4	4	0	0	0	0	0	0	0	0
Gas Line Backhoe	D	6	1	1	1	1	0	0	0	0	0	0	0	0
Gas Line Compressor	D	3	2	2	2	2	0	0	0	0	0	0	0	0
Gas Line Front-end loader	D	5	2	2	2	2	0	0	0	0	0	0	0	0
Gas Line Compactor	D	4	1	1	1	1	0	0	0	0	0	0	0	0
Gas Line Excavator	D	6	1	1	1	1	0	0	0	0	0	0	0	0
Gas Line 15 ton crane	D	4	2	2	2	2	0	0	0	0	0	0	0	0
Gas Line Roller	D	4	1	1	1	1	0	0	0	0	0	0	0	0
Gas Line Reed Screen	D	6	1	1	1	1	0	0	0	0	0	0	0	0
Motor Vehicles														
On-Site Pickup Truck	G	30	2	2	2	2	0	0	0	0	0	0	0	0
Off-Site Dump Truck	D	30	1	1	1	1	0	0	0	0	0	0	0	0
On-Site Water Truck	D	20	1	1	1	1	0	0	0	0	0	0	0	0
Off-Site Concrete Truck	D	80	1	1	1	1	0	0	0	0	0	0	0	0
Off-Site Delivery Truck	D	80	1	1	1	1	0	0	0	0	0	0	0	0
Off-Site Construction Worker Commute	G	80	20	20	20	20	0	0	0	0	0	0	0	0
Transmission Line														
Construction Equipment														
15 ton crane	D	10	2	2	2	2	2	2	2	2	2	2	2	1
Forklift	D	10	2	2	2	2	2	2	2	2	1	1	1	1
Motor Vehicles														
On-Site Pickup Truck	G	10	1	1	1	1	1	1	1	1	1	1	1	0
On-Site Line Truck	D	10	1	1	1	1	1	1	1	1	1	1	1	1
Off-Site Pickup Truck	G	20	1	1	1	1	1	1	1	1	1	1	1	0
Off-Site Line Truck	D	20	1	1	1	1	1	1	1	1	1	1	1	1

Table 2
Mandalay Construction Equipment and Motor Vehicle Use

Equipment/Vehicle Type	Fuel	Bi-Weekly Operating Hours or Miles[a]											
		Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8	Period 9	Period 10	Period 11	Period 12
Power Plant													
Construction Equipment													
Welding rigs	D	160	160	160	160	160	160	160	160	160	80	80	0
Backhoe	D	80	160	160	160	160	160	80	80	80	80	0	0
Compressor	D	80	160	320	320	320	240	160	160	0	0	0	0
Front-end loader	D	0	80	80	80	80	80	80	80	0	0	0	0
15 ton crane	D	0	80	80	240	240	240	160	160	160	80	80	80
75 ton crane	D	0	0	0	80	80	80	80	80	80	0	0	0
Generator	D	160	160	160	160	80	80	80	80	0	0	0	0
Scraper	D	80	80	80	80	80	80	80	0	0	0	0	0
Forklift	D	160	240	240	240	240	160	160	160	160	80	80	80
Manlift	D	160	160	160	160	80	80	80	0	0	0	0	0
Dewatering drill rig	D	10	10	10	0	0	0	0	0	0	0	0	0
Motor Vehicles													
On-Site Pickup Truck	G	200	400	400	600	600	400	400	400	200	400	600	800
On-Site Construction Worker Commute	G	24	88	120	152	144	96	96	64	16	16	16	16
On-Site Water Truck	D	160	160	160	160	160	160	160	160	160	160	0	0
Off-Site Dump Truck	D	400	800	800	400	400	0	0	0	0	0	0	0
Off-Site Concrete Truck	D	0	2,000	2,000	0	0	0	0	0	0	0	0	0
Off-Site Delivery Truck	D	0	400	400	400	400	400	400	400	0	0	0	0
Off-Site Construction Worker Commute	G	1,680	6,160	8,400	10,640	10,080	6,720	6,720	4,480	1,120	1,120	1,120	1,120
Gas Line													
Construction Equipment													
Gas Line Welding rigs	D	192	192	192	192	0	0	0	0	0	0	0	0
Gas Line Backhoe	D	48	48	48	48	0	0	0	0	0	0	0	0
Gas Line Compressor	D	48	48	48	48	0	0	0	0	0	0	0	0
Gas Line Front-end loader	D	80	80	80	80	0	0	0	0	0	0	0	0
Gas Line Compactor	D	32	32	32	32	0	0	0	0	0	0	0	0
Gas Line Excavator	D	48	48	48	48	0	0	0	0	0	0	0	0
Gas Line 15 ton crane	D	64	64	64	64	0	0	0	0	0	0	0	0
Gas Line Roller	D	32	32	32	32	0	0	0	0	0	0	0	0
Gas Line Reed Screen	D	48	48	48	48	0	0	0	0	0	0	0	0
Motor Vehicles													
On-Site Pickup Truck	G	480	480	480	480	0	0	0	0	0	0	0	0
Off-Site Dump Truck	D	240	240	240	240	0	0	0	0	0	0	0	0
On-Site Water Truck	D	160	160	160	160	0	0	0	0	0	0	0	0
Off-Site Concrete Truck	D	640	640	640	640	0	0	0	0	0	0	0	0
Off-Site Delivery Truck	D	640	640	640	640	0	0	0	0	0	0	0	0
Off-Site Construction Worker Commute	G	12,800	12,800	12,800	12,800	0	0	0	0	0	0	0	0
Transmission Line													
Construction Equipment													
15 ton crane	D	160	160	160	160	160	160	160	160	160	160	160	80
Forklift	D	160	160	160	160	160	160	160	160	80	80	80	80
Motor Vehicles													
On-Site Pickup Truck	G	80	80	80	80	80	80	80	80	80	80	80	0
On-Site Line Truck	D	80	80	80	80	80	80	80	80	80	80	80	80
Off-Site Pickup Truck	G	160	160	160	160	160	160	160	160	160	160	160	0
Off-Site Line Truck	D	160	160	160	160	160	160	160	160	160	160	160	160

[a] Based on 8 working days per bi-weekly period

Table 3
Mandalay Construction Equipment and Motor Vehicle Exhaust CO2 Emissions

Equipment/Vehicle Type	Emission Factor	Bi-Weekly Emissions (lb)											
		Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8	Period 9	Period 10	Period 11	Period 12
Power Plant													
Construction Equipment													
Welding rigs	26.0	4,153.3	4,153.3	4,153.3	4,153.3	4,153.3	4,153.3	4,153.3	4,153.3	4,153.3	2,076.6	2,076.6	0.0
Backhoe	101.4	8,111.0	16,221.9	16,221.9	16,221.9	16,221.9	16,221.9	8,111.0	8,111.0	8,111.0	8,111.0	0.0	0.0
Compressor	22.3	1,781.7	3,563.4	7,126.8	7,126.8	7,126.8	5,345.1	3,563.4	3,563.4	0.0	0.0	0.0	0.0
Front-end loader	106.3	0.0	8,505.2	8,505.2	8,505.2	8,505.2	8,505.2	8,505.2	8,505.2	0.0	0.0	0.0	0.0
15 ton crane	80.3	0.0	6,427.6	6,427.6	19,282.7	19,282.7	19,282.7	12,855.1	12,855.1	12,855.1	6,427.6	6,427.6	6,427.6
75 ton crane	112.2	0.0	0.0	0.0	8,972.7	8,972.7	8,972.7	8,972.7	8,972.7	8,972.7	0.0	0.0	0.0
Generator	30.6	4,899.7	4,899.7	4,899.7	4,899.7	2,449.8	2,449.8	2,449.8	2,449.8	0.0	0.0	0.0	0.0
Scraper	262.5	21,000.2	21,000.2	21,000.2	21,000.2	21,000.2	21,000.2	21,000.2	0.0	0.0	0.0	0.0	0.0
Forklift	54.4	8,703.3	13,055.0	13,055.0	13,055.0	13,055.0	8,703.3	8,703.3	8,703.3	8,703.3	4,351.7	4,351.7	4,351.7
Manlift	34.7	5,555.5	5,555.5	5,555.5	5,555.5	2,777.7	2,777.7	2,777.7	0.0	0.0	0.0	0.0	0.0
Dewatering drill rig	141.1	1,410.8	1,410.8	1,410.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Equipment Total		**55,615.4**	**84,792.5**	**88,355.9**	**108,772.9**	**103,545.4**	**97,412.0**	**81,091.8**	**57,313.9**	**42,795.4**	**20,966.8**	**12,855.9**	**10,779.2**
Motor Vehicles													
On-Site Pickup Truck	1.107	221.3	442.7	442.7	664.0	664.0	442.7	442.7	442.7	221.3	442.7	664.0	885.4
On-Site Construction Worker Commute	1.107	26.6	97.4	132.8	168.2	159.4	106.2	106.2	70.8	17.7	17.7	17.7	17.7
On-Site Water Truck	4.222	675.5	675.5	675.5	675.5	675.5	675.5	675.5	675.5	675.5	675.5	0.0	0.0
Off-Site Dump Truck	4.222	1,688.7	3,377.5	3,377.5	1,688.7	1,688.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Concrete Truck	4.222	0.0	8,443.7	8,443.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Delivery Truck	4.222	0.0	1,688.7	1,688.7	1,688.7	1,688.7	1,688.7	1,688.7	1,688.7	0.0	0.0	0.0	0.0
Off-Site Construction Worker Commute	1.107	1,859.3	6,817.4	9,296.5	11,775.5	11,155.8	7,437.2	7,437.2	4,958.1	1,239.5	1,239.5	1,239.5	1,239.5
Motor Vehicle Total		**4,471.4**	**21,542.9**	**24,057.4**	**16,660.8**	**16,032.1**	**10,350.3**	**10,350.3**	**7,835.9**	**2,154.1**	**2,375.4**	**1,921.3**	**2,142.6**
Gas Line													
Construction Equipment													
Gas Line Welding rigs	26.0	4,983.9	4,983.9	4,983.9	4,983.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gas Line Backhoe	51.7	2,482.9	2,482.9	2,482.9	2,482.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gas Line Compressor	22.3	1,069.0	1,069.0	1,069.0	1,069.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gas Line Front-end loader	106.3	8,505.2	8,505.2	8,505.2	8,505.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gas Line Compactor	67.1	2,145.7	2,145.7	2,145.7	2,145.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gas Line Excavator	73.6	3,533.9	3,533.9	3,533.9	3,533.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gas Line 15 ton crane	112.2	7,178.2	7,178.2	7,178.2	7,178.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gas Line Roller	67.1	2,145.7	2,145.7	2,145.7	2,145.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gas Line Reed Screen	80.9	3,881.2	3,881.2	3,881.2	3,881.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Equipment Total		**35,925.8**	**35,925.8**	**35,925.8**	**35,925.8**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Motor Vehicles													
On-Site Pickup Truck	1.107	531.2	531.2	531.2	531.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site Construction Worker Commute	1.107	265.6	265.6	265.6	265.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Dump Truck	4.222	675.5	675.5	675.5	675.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Concrete Truck	4.222	2,702.0	2,702.0	2,702.0	2,702.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Delivery Truck	4.222	2,702.0	2,702.0	2,702.0	2,702.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Construction Worker Commute	1.107	14,166.0	14,166.0	14,166.0	14,166.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Motor Vehicle Total		**21,042.3**	**21,042.3**	**21,042.3**	**21,042.3**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Transmission Line													
Construction Equipment													
15 ton crane	80.3	12,855.1	12,855.1	12,855.1	12,855.1	12,855.1	12,855.1	12,855.1	12,855.1	12,855.1	12,855.1	12,855.1	6,427.6
Forklift	54.4	8,703.3	8,703.3	8,703.3	8,703.3	8,703.3	8,703.3	8,703.3	8,703.3	4,351.7	4,351.7	4,351.7	4,351.7
Construction Equipment Total		**21,558.5**	**21,558.5**	**21,558.5**	**21,558.5**	**21,558.5**	**21,558.5**	**21,558.5**	**21,558.5**	**17,206.8**	**17,206.8**	**17,206.8**	**10,779.2**
Motor Vehicles													
On-Site Pickup Truck	1.107	88.5	88.5	88.5	88.5	88.5	88.5	88.5	88.5	88.5	88.5	88.5	0.0
On-Site Line Truck	4.222	337.7	337.7	337.7	337.7	337.7	337.7	337.7	337.7	337.7	337.7	337.7	337.7
Off-Site Pickup Truck	1.107	177.1	177.1	177.1	177.1	177.1	177.1	177.1	177.1	177.1	177.1	177.1	0.0
Off-Site Line Truck	4.222	675.5	675.5	675.5	675.5	675.5	675.5	675.5	675.5	675.5	675.5	675.5	675.5
Motor Vehicle Total		**1,278.9**	**1,278.9**	**1,278.9**	**1,278.9**	**1,278.9**	**1,278.9**	**1,278.9**	**1,278.9**	**1,278.9**	**1,278.9**	**1,278.9**	**1,013.2**

Total During Construction (lb)													
Construction Equipment		1,142,867.5											
Motor Vehicles		219,144.5											
Total		1,362,012.0											
Total During Construction (tons)													
Construction Equipment		571.4											
Motor Vehicles		109.6											
Total		681.0											

Note: Totals may not match sum of individual values because of rounding.

Table 4
Construction Equipment Exhaust CO2 Emission Factors

Equipment Type	Fuel	Horsepower	ARB Off-Road Model Category	CO_2 (lb/hr)[a]
Welding rigs	D	35	Welders	26.0
Backhoe	D	175	Tractors/Loaders/Backhoes	101.4
Compressor	D	37	Air Compressors	22.3
Front-end loader	D	147	Rubber Tired Loaders	106.3
15 ton crane	D	175	Cranes	80.3
75 ton crane	D	250	Cranes	112.2
Generator	D	40	Generator Sets	30.6
Scraper	D	200	Scrapers	262.5
Forklift	D	150	Forklifts	54.4
Manlift	D	150	Aerial Lifts	34.7
Dewatering drill rig	D	125	Bore/Drill Rigs	141.1
Gas Line Welding rigs	D	38	Welders	26.0
Gas Line Backhoe	D	118	Tractors/Loaders/Backhoes	51.7
Gas Line Compressor	D	49	Air Compressors	22.3
Gas Line Front-end loader	D	140	Rubber Tired Loaders	106.3
Gas Line Compactor	D	99	Rollers	67.1
Gas Line Excavator	D	99	Excavators	73.6
Gas Line 15 ton crane	D	230	Cranes	112.2
Gas Line Roller	D	65	Rollers	67.1
Gas Line Reed Screen	D	65	Other Construction Equipment	80.9

[a] From Table 5

Emissions [pounds per day] = Emission factor [pounds per hour] x Number pieces of equipment x Operating time for each piece [hours per day]

SCAB Fleet Average Emission Factors (Diesel)

Air Basin	SC

Table 5
Construction Equipment Emissions Factors for 2007 by Equipment Catgeory and Horsepower Range[a]

Equipment	MaxHP	ROG (lb/hr)	CO (lb/hr)	NOX (lb/hr)	SOX (lb/hr)	PM (lb/hr)	CO2 (lb/hr)
Aerial Lifts	15	0.0120	0.0539	0.0784	0.0001	0.0055	8.7
	25	0.0268	0.0678	0.1103	0.0001	0.0083	11.0
	50	0.0867	0.2042	0.2062	0.0003	0.0210	19.6
	120	0.0819	0.2563	0.5110	0.0004	0.0398	38.1
	500	0.1827	0.7381	2.2160	0.0021	0.0703	212.9
	750	0.3397	1.3341	4.1001	0.0039	0.1287	384.8
Aerial Lifts Composite		0.0781	0.2253	0.4026	0.0004	0.0279	34.7
Air Compressors	15	0.0163	0.0539	0.0928	0.0001	0.0071	7.2
	25	0.0376	0.0934	0.1473	0.0002	0.0113	14.4
	50	0.1306	0.2933	0.2468	0.0003	0.0290	22.3
	120	0.1158	0.3415	0.6762	0.0006	0.0591	47.0
	175	0.1434	0.5150	1.1478	0.0010	0.0615	88.5
	250	0.1459	0.4071	1.6003	0.0015	0.0557	131.2
	500	0.2288	0.8865	2.5465	0.0023	0.0889	231.7
	750	0.3607	1.3701	4.0281	0.0036	0.1390	358.1
	1000	0.6027	2.3256	6.5406	0.0049	0.2054	486.4
Air Compressors Composite		0.1285	0.3872	0.8302	0.0007	0.0579	63.6
Bore/Drill Rigs	15	0.0124	0.0632	0.0788	0.0002	0.0057	10.3
	25	0.0222	0.0689	0.1397	0.0002	0.0089	16.0
	50	0.0980	0.2886	0.2959	0.0004	0.0288	31.0
	120	0.1208	0.5011	0.8412	0.0009	0.0680	77.1
	175	0.1383	0.7539	1.2916	0.0016	0.0650	141.1
	250	0.1125	0.3532	1.6315	0.0021	0.0426	188.1
	500	0.1628	0.5678	2.2334	0.0031	0.0659	311.3
	750	0.3368	1.1219	4.6545	0.0062	0.1342	615.1
	1000	0.7011	1.9338	9.8819	0.0093	0.2471	928.3
Bore/Drill Rigs Composite		0.1457	0.5388	1.4734	0.0017	0.0648	164.9
Cement and Mortar M	15	0.0092	0.0399	0.0596	0.0001	0.0042	6.3
	25	0.0428	0.1084	0.1763	0.0002	0.0133	17.6
Cement and Mortar Mixers Compos		0.0120	0.0455	0.0693	0.0001	0.0050	7.2
Concrete/Industrial S	25	0.0215	0.0689	0.1402	0.0002	0.0089	16.5
	50	0.1513	0.3517	0.3238	0.0004	0.0352	30.2
	120	0.1654	0.5152	1.0187	0.0009	0.0830	74.1
	175	0.2336	0.8939	1.9684	0.0018	0.0987	160.2
Concrete/Industrial Saws Composit		0.1561	0.4487	0.7639	0.0007	0.0640	58.5
Cranes	50	0.1555	0.3455	0.2666	0.0003	0.0334	23.2
	120	0.1338	0.3855	0.7667	0.0006	0.0693	50.1
	175	0.1417	0.4975	1.1009	0.0009	0.0615	80.3
	250	0.1478	0.4119	1.4665	0.0013	0.0571	112.2
	500	0.2121	0.8483	2.1049	0.0018	0.0819	180.1
	750	0.3600	1.4213	3.6197	0.0030	0.1389	303.0
	9999	1.2786	5.2276	13.5665	0.0098	0.4345	970.6
Cranes Composite		0.1882	0.6365	1.6948	0.0014	0.0755	128.7
Crawler Tractors	50	0.1727	0.3812	0.2897	0.0003	0.0368	24.9
	120	0.1844	0.5217	1.0539	0.0008	0.0941	65.8
	175	0.2256	0.7814	1.7367	0.0014	0.0979	121.2
	250	0.2386	0.6707	2.2824	0.0019	0.0932	166.1
	500	0.3324	1.5264	3.1976	0.0025	0.1289	259.2
	750	0.5988	2.7192	5.8408	0.0047	0.2324	464.7
	1000	0.9273	4.2839	9.5522	0.0066	0.3239	658.1
Crawler Tractors Composite		0.2180	0.7090	1.6218	0.0013	0.0988	114.0
Crushing/Proc. Equip	50	0.2623	0.5917	0.4879	0.0006	0.0582	44.0

Air Basin	SC

Table 5
Construction Equipment Emissions Factors for 2007 by Equipment Catgeory and Horsepower Range[a]

Equipment	MaxHP	ROG (lb/hr)	CO (lb/hr)	NOX (lb/hr)	SOX (lb/hr)	PM (lb/hr)	CO2 (lb/hr)
	120	0.2051	0.6092	1.1923	0.0010	0.1061	83.1
	175	0.2709	0.9819	2.1527	0.0019	0.1174	167.3
	250	0.2682	0.7429	2.9565	0.0028	0.1022	244.5
	500	0.3634	1.3803	4.0348	0.0037	0.1413	373.6
	750	0.5796	2.0915	6.5366	0.0059	0.2229	588.8
	9999	1.6038	5.9800	17.5501	0.0131	0.5443	1,307.8
Crushing/Proc. Equipment Compos		0.2499	0.7817	1.6553	0.0015	0.1048	132.3
Dumpers/Tenders	25	0.0137	0.0383	0.0709	0.0001	0.0049	7.6
Dumpers/Tenders Composite		0.0137	0.0383	0.0709	0.0001	0.0049	7.6
Excavators	25	0.0206	0.0677	0.1353	0.0002	0.0088	16.4
	50	0.1510	0.3526	0.2778	0.0003	0.0341	25.0
	120	0.1786	0.5504	1.0305	0.0009	0.0963	73.6
	175	0.1792	0.6758	1.3897	0.0013	0.0794	112.2
	250	0.1726	0.4642	1.8559	0.0018	0.0641	158.7
	500	0.2295	0.7653	2.3809	0.0023	0.0858	233.7
	750	0.3841	1.2645	4.0758	0.0039	0.1444	387.4
Excavators Composite		0.1816	0.5977	1.4225	0.0013	0.0776	119.6
Forklifts	50	0.0932	0.2119	0.1643	0.0002	0.0206	14.7
	120	0.0786	0.2337	0.4359	0.0004	0.0428	31.2
	175	0.0934	0.3343	0.7024	0.0006	0.0416	56.1
	250	0.0762	0.1920	0.8930	0.0009	0.0273	77.1
	500	0.0988	0.2777	1.1190	0.0011	0.0364	111.0
Forklifts Composite		0.0861	0.2495	0.6430	0.0006	0.0346	54.4
Generator Sets	15	0.0198	0.0761	0.1277	0.0002	0.0081	10.2
	25	0.0349	0.1140	0.1798	0.0002	0.0123	17.6
	50	0.1294	0.3076	0.3197	0.0004	0.0318	30.6
	120	0.1638	0.5185	1.0338	0.0009	0.0791	77.9
	175	0.1944	0.7569	1.6938	0.0016	0.0795	142.0
	250	0.1982	0.5974	2.3843	0.0024	0.0737	212.5
	500	0.2824	1.1211	3.4731	0.0033	0.1084	336.9
	750	0.4695	1.8098	5.7390	0.0055	0.1771	543.8
	9999	1.1949	4.4076	13.2584	0.0105	0.4151	1,048.6
Generator Sets Composite		0.1130	0.3549	0.7249	0.0007	0.0446	61.0
Graders	50	0.1733	0.3929	0.3101	0.0004	0.0381	27.5
	120	0.1902	0.5657	1.1025	0.0009	0.0996	75.0
	175	0.2073	0.7540	1.6258	0.0014	0.0907	123.9
	250	0.2088	0.5808	2.1482	0.0019	0.0803	172.1
	500	0.2487	0.9672	2.5414	0.0023	0.0960	229.5
	750	0.5320	2.0374	5.5148	0.0049	0.2053	485.7
Graders Composite		0.2055	0.6712	1.7198	0.0015	0.0886	132.7
Off-Highway Tractors	120	0.2830	0.7723	1.6142	0.0011	0.1402	93.7
	175	0.2641	0.8840	2.0209	0.0015	0.1135	130.4
	250	0.2149	0.6125	1.9515	0.0015	0.0852	130.4
	750	0.8341	4.3552	7.8223	0.0057	0.3265	568.1
	1000	1.2771	6.7361	12.5734	0.0082	0.4551	814.3
Off-Highway Tractors Composite		0.2692	0.9270	2.2742	0.0017	0.1107	151.5
Off-Highway Trucks	175	0.2093	0.7697	1.5881	0.0014	0.0920	125.1
	250	0.1933	0.5096	1.9993	0.0019	0.0709	166.5
	500	0.2870	0.9451	2.8530	0.0027	0.1051	272.3
	750	0.4689	1.5279	4.7727	0.0044	0.1730	441.7
	1000	0.7528	2.6058	8.3284	0.0063	0.2569	624.7
Off-Highway Trucks Composite		0.2881	0.9133	2.9144	0.0027	0.1056	260.1
Other Construction E	15	0.0121	0.0617	0.0770	0.0002	0.0056	10.1
	25	0.0183	0.0570	0.1155	0.0002	0.0074	13.2
	50	0.1356	0.3262	0.2942	0.0004	0.0324	28.0
	120	0.1711	0.5607	1.0579	0.0009	0.0896	80.9
	175	0.1464	0.5955	1.2310	0.0012	0.0641	106.5

Air Basin	SC

Table 5
Construction Equipment Emissions Factors for 2007 by Equipment Catgeory and Horsepower Range[a]

Equipment	MaxHP	ROG (lb/hr)	CO (lb/hr)	NOX (lb/hr)	SOX (lb/hr)	PM (lb/hr)	CO2 (lb/hr)
	500	0.2095	0.7692	2.4473	0.0025	0.0825	254.2
Other Construction Equipment Com		0.1311	0.4749	1.2411	0.0013	0.0539	122.8
Other General Indust	15	0.0067	0.0391	0.0470	0.0001	0.0034	6.4
	25	0.0192	0.0632	0.1266	0.0002	0.0082	15.3
	50	0.1476	0.3260	0.2499	0.0003	0.0317	21.7
	120	0.1671	0.4756	0.9336	0.0007	0.0877	62.0
	175	0.1706	0.5880	1.3014	0.0011	0.0746	95.9
	250	0.1630	0.4366	1.7266	0.0015	0.0614	135.6
	500	0.2851	1.0467	3.0123	0.0026	0.1087	265.4
	750	0.4755	1.7251	5.0871	0.0044	0.1816	437.4
	1000	0.7280	2.7744	7.7949	0.0056	0.2473	559.6
Other General Industrial Equipmen		0.2111	0.6987	1.9012	0.0016	0.0850	152.2
Other Material Handli	50	0.2034	0.4495	0.3473	0.0004	0.0437	30.3
	120	0.1620	0.4626	0.9094	0.0007	0.0848	60.7
	175	0.2152	0.7444	1.6495	0.0014	0.0939	122.1
	250	0.1729	0.4654	1.8395	0.0016	0.0653	145.0
	500	0.2038	0.7541	2.1690	0.0019	0.0781	191.6
	9999	0.9597	3.6689	10.2941	0.0073	0.3256	741.3
Other Material Handling Equipment		0.2038	0.6298	1.8362	0.0015	0.0819	141.2
Pavers	25	0.0368	0.0997	0.1770	0.0002	0.0125	18.7
	50	0.1881	0.4131	0.3234	0.0004	0.0401	28.0
	120	0.1921	0.5429	1.1172	0.0008	0.0958	69.2
	175	0.2363	0.8214	1.8559	0.0014	0.1015	128.3
	250	0.2844	0.8186	2.7050	0.0022	0.1128	194.4
	500	0.3028	1.4943	2.9397	0.0023	0.1194	233.2
Pavers Composite		0.2062	0.6000	1.1291	0.0009	0.0799	77.9
Paving Equipment	25	0.0175	0.0544	0.1103	0.0002	0.0070	12.6
	50	0.1593	0.3498	0.2759	0.0003	0.0340	23.9
	120	0.1501	0.4248	0.8753	0.0006	0.0748	54.5
	175	0.1842	0.6413	1.4542	0.0011	0.0789	101.0
	250	0.1774	0.5124	1.6935	0.0014	0.0704	122.3
Paving Equipment Composite		0.1556	0.4693	1.0333	0.0008	0.0708	69.0
Plate Compactors	15	0.0054	0.0263	0.0351	0.0001	0.0025	4.3
Plate Compactors Composite		0.0054	0.0263	0.0351	0.0001	0.0025	4.3
Pressure Washers	15	0.0095	0.0365	0.0612	0.0001	0.0039	4.9
	25	0.0142	0.0462	0.0729	0.0001	0.0050	7.1
	50	0.0491	0.1223	0.1449	0.0002	0.0131	14.3
	120	0.0463	0.1529	0.3055	0.0003	0.0216	24.1
Pressure Washers Composite		0.0235	0.0705	0.1079	0.0001	0.0081	9.4
Pumps	15	0.0168	0.0554	0.0954	0.0001	0.0073	7.4
	25	0.0507	0.1260	0.1987	0.0002	0.0153	19.5
	50	0.1541	0.3621	0.3619	0.0004	0.0371	34.3
	120	0.1685	0.5265	1.0488	0.0009	0.0822	77.9
	175	0.1977	0.7584	1.6961	0.0016	0.0816	140.1
	250	0.1941	0.5771	2.2926	0.0023	0.0727	201.4
	500	0.2982	1.2024	3.5991	0.0034	0.1149	345.2
	750	0.5068	1.9878	6.0902	0.0057	0.1923	570.7
	9999	1.5682	5.9197	17.3104	0.0136	0.5441	1,354.8
Pumps Composite		0.1090	0.3243	0.6224	0.0006	0.0439	49.6
Rollers	15	0.0076	0.0386	0.0482	0.0001	0.0035	6.3
	25	0.0185	0.0575	0.1165	0.0002	0.0074	13.3
	50	0.1520	0.3436	0.2884	0.0003	0.0338	26.0
	120	0.1450	0.4326	0.8650	0.0007	0.0734	59.0
	175	0.1748	0.6398	1.4194	0.0012	0.0748	108.1
	250	0.1867	0.5391	1.9194	0.0017	0.0729	153.1
	500	0.2375	1.0016	2.4749	0.0022	0.0933	219.1
Rollers Composite		0.1410	0.4419	0.9073	0.0008	0.0629	67.1

Air Basin	SC

Table 5
Construction Equipment Emissions Factors for 2007 by Equipment Catgeory and Horsepower Range[a]

Equipment	MaxHP	ROG (lb/hr)	CO (lb/hr)	NOX (lb/hr)	SOX (lb/hr)	PM (lb/hr)	CO2 (lb/hr)
Rough Terrain Forklif	50	0.2019	0.4635	0.3746	0.0004	0.0452	33.9
	120	0.1508	0.4598	0.8819	0.0007	0.0798	62.4
	175	0.1981	0.7390	1.5699	0.0014	0.0871	124.9
	250	0.1880	0.5203	2.0303	0.0019	0.0716	170.8
	500	0.2518	0.8995	2.6920	0.0025	0.0973	256.6
Rough Terrain Forklifts Composite		0.1576	0.4928	0.9631	0.0008	0.0800	70.3
Rubber Tired Dozers	175	0.2712	0.8964	2.0450	0.0015	0.1164	129.5
	250	0.3139	0.8843	2.8004	0.0021	0.1236	183.5
	500	0.4045	2.1197	3.6631	0.0026	0.1563	264.9
	750	0.6094	3.1710	5.5926	0.0040	0.2361	398.8
	1000	0.9543	5.0610	9.2959	0.0060	0.3417	591.9
Rubber Tired Dozers Composite		0.3789	1.6950	3.4143	0.0025	0.1474	239.1
Rubber Tired Loaders	25	0.0221	0.0708	0.1440	0.0002	0.0092	16.9
	50	0.1938	0.4399	0.3495	0.0004	0.0427	31.1
	120	0.1480	0.4419	0.8601	0.0007	0.0775	58.9
	175	0.1759	0.6425	1.3849	0.0012	0.0769	106.3
	250	0.1781	0.4960	1.8452	0.0017	0.0684	149.0
	500	0.2528	0.9706	2.6039	0.0023	0.0977	237.0
	750	0.5240	1.9793	5.4711	0.0049	0.2022	485.5
	1000	0.7317	2.8295	8.0073	0.0060	0.2487	593.9
Rubber Tired Loaders Composite		0.1730	0.5552	1.3821	0.0012	0.0768	108.6
Scrapers	120	0.2643	0.7453	1.5133	0.0011	0.1342	93.9
	175	0.2768	0.9565	2.1368	0.0017	0.1199	148.1
	250	0.3046	0.8606	2.9011	0.0024	0.1195	209.5
	500	0.4168	1.9485	4.0046	0.0032	0.1622	321.4
	750	0.7239	3.3468	7.0442	0.0056	0.2818	555.3
Scrapers Composite		0.3677	1.5249	3.3991	0.0027	0.1465	262.5
Signal Boards	15	0.0072	0.0377	0.0453	0.0001	0.0033	6.2
	50	0.1740	0.4062	0.3843	0.0005	0.0411	36.2
	120	0.1772	0.5523	1.0878	0.0009	0.0884	80.2
	175	0.2227	0.8540	1.8787	0.0017	0.0939	154.5
	250	0.2504	0.7317	2.9189	0.0029	0.0951	255.3
Signal Boards Composite		0.0254	0.0972	0.1806	0.0002	0.0115	16.7
Skid Steer Loaders	25	0.0315	0.0814	0.1358	0.0002	0.0100	13.8
	50	0.1126	0.2842	0.2606	0.0003	0.0282	25.5
	120	0.0840	0.2923	0.5256	0.0005	0.0455	42.8
Skid Steer Loaders Composite		0.0981	0.2735	0.3375	0.0004	0.0326	30.3
Surfacing Equipment	50	0.0708	0.1644	0.1519	0.0002	0.0165	14.1
	120	0.1455	0.4496	0.9017	0.0007	0.0718	63.8
	175	0.1281	0.4896	1.0832	0.0010	0.0539	85.8
	250	0.1521	0.4563	1.6282	0.0015	0.0589	134.9
	500	0.2227	0.9889	2.4265	0.0022	0.0873	221.2
	750	0.3558	1.5437	3.8879	0.0035	0.1379	347.0
Surfacing Equipment Composite		0.1864	0.7654	1.8498	0.0017	0.0712	166.0
Sweepers/Scrubbers	15	0.0125	0.0729	0.0878	0.0002	0.0064	11.9
	25	0.0251	0.0821	0.1673	0.0002	0.0106	19.6
	50	0.1973	0.4427	0.3522	0.0004	0.0434	31.6
	120	0.1885	0.5540	1.0600	0.0009	0.1003	75.0
	175	0.2297	0.8158	1.7675	0.0016	0.1010	139.0
	250	0.1660	0.4343	1.9127	0.0018	0.0611	162.0
Sweepers/Scrubbers Composite		0.1963	0.5672	1.0277	0.0009	0.0819	78.5
Tractors/Loaders/Bac	25	0.0254	0.0741	0.1443	0.0002	0.0095	15.9
	50	0.1684	0.3985	0.3286	0.0004	0.0389	30.3
	120	0.1179	0.3748	0.6979	0.0006	0.0635	51.7
	175	0.1513	0.5918	1.2085	0.0011	0.0672	101.4
	250	0.1714	0.4716	1.9310	0.0019	0.0643	171.7
	500	0.3074	1.0278	3.3772	0.0039	0.1177	344.9

Air Basin	SC

Table 5
Construction Equipment Emissions Factors for 2007 by Equipment Catgeory and Horsepower Range[a]

Equipment	MaxHP	ROG (lb/hr)	CO (lb/hr)	NOX (lb/hr)	SOX (lb/hr)	PM (lb/hr)	CO2 (lb/hr)
	750	0.4689	1.5371	5.2373	0.0058	0.1793	517.3
Tractors/Loaders/Backhoes Compo		0.1307	0.4142	0.8303	0.0008	0.0639	66.8
Trenchers	15	0.0099	0.0517	0.0622	0.0001	0.0046	8.5
	25	0.0429	0.1377	0.2800	0.0004	0.0179	32.9
	50	0.2110	0.4651	0.3764	0.0004	0.0454	32.9
	120	0.1767	0.5030	1.0427	0.0008	0.0868	64.9
	175	0.2602	0.9129	2.0726	0.0016	0.1109	143.9
	250	0.3246	0.9471	3.0938	0.0025	0.1293	222.9
	500	0.4018	2.0679	3.9323	0.0031	0.1591	311.3
	750	0.7640	3.8744	7.5254	0.0059	0.3008	586.9
Trenchers Composite		0.1942	0.5171	0.8578	0.0007	0.0714	58.7
Welders	15	0.0140	0.0463	0.0798	0.0001	0.0061	6.2
	25	0.0294	0.0730	0.1151	0.0001	0.0088	11.3
	50	0.1392	0.3169	0.2825	0.0003	0.0317	26.0
	120	0.0931	0.2798	0.5556	0.0005	0.0468	39.5
	175	0.1516	0.5570	1.2432	0.0011	0.0642	98.2
	250	0.1264	0.3603	1.4180	0.0013	0.0481	119.1
	500	0.1582	0.6316	1.8085	0.0016	0.0615	167.6
Welders Composite		0.0917	0.2336	0.3191	0.0003	0.0297	25.6

Emission factors sent by ARB on December 7, 2006 in grams per hour. EF converted by SCAQMD to pounds per hour.

[a] These are composite horsepower-based off-road emission factors for 2007 developed for the SCAQMD by CARB from its Off-road Model. The composite off-road emission factors were derived based on the equipment category (tractor, dozer, scraper, etc.), and average equipment age and horsepower rating within horsepower ranges for the year. The emission factors can be downloaded from http://www.aqmd.gov/ceqa/hdbk.html/offroadEF_0620.xls

Table 6
2007 Motor Vehicle Exhaust CO2 Emission Factors

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO2	1.10672	CO2	4.2218

Source: SCAQMD CEQA Analysis Guidance Handbook Web Site,
http://www.aqmd.gov/ceqa/hdbk.html

Note: The emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model. A weighted average of vehicle types was used to calculate emission factors for passenger vehicles, and emission factors for heavy heavy-duty diesel trucks were used for delivery trucks. All the emission factors account for the emissions from start, running and idling exhaust.

Vehicle Type	Exhaust Emission Factors
On-Site Pickup Truck	1.10672
On-Site Construction Worker Commute	1.10672
On-Site Water Truck	4.22184
On-Site Line Truck	4.22184
Off-Site Dump Truck	4.22184
Off-Site Concrete Truck	4.22184
Off-Site Delivery Truck	4.22184
Off-Site Line Truck	4.22184
Off-Site Pickup Truck	1.10672
Off-Site Construction Worker Commute	1.10672

Emissions [pounds/day] = Emission factor [pounds/mile] x Vehicle miles traveled [miles/day]