APPENDIX 6A

California Energy Commission Staff Report *Opportunities to Expand Coastal Power Plants in California* (June 1980)

STAFF REPORT

OPPORTUNITIES TO EXPAND COASTAL POWER PLANTS IN CALIFORNIA

PREPARED BY

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California Energy Commission

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EXECUTIVE SUMMARY

CONCLUSION

Areas "designated" by the California Coastal Commission (CCC) and the San Francisco Bay Conservation and Development Commission (BCDC) do not preclude opportunities for the reasonable expansion of existing coastal zone power plants. The most serious constraints to the expansion of these plants are the lack of sufficient available land, air quality "trade-offs," and restrictions on the future use of the ocean for "once-through" cooling water supplies. The combined effect of these factors poses the most significant constraints to the expansion of oil- and gas-fired power plants. Based on these results, the California Energy Commission (CEC) staff does not recommend any changes to the CCC and BCDC designations to accomodate the expansion of the noted power plants.

Project Description

This study examines opportunities to expand existing coastal zone power plants in California. It was conducted by the CEC in conjunction with the CCC and the BCDC to determine the effects of CCC and BCDC designated areas on reasonable expansion opportunities. It is a response to the mandates in Public Resources Code (PRC) Section 30413 and Government Code (GC) Section 66654. These legal mandates require the CCC and the BCDC to "designate" areas of their respective coastal zone jurisdictions where the location of a power plant of 50 MW or greater would prevent achievement of coastal resource protection objectives. These laws also require that existing power plants be provided with "reasonable" expansion opportunities.

Designated areas limit the siting opportunities of new electrical-generating power plants in the state's coastal zone and, thereby, put a premium on the expansion of the existing coastal power plants. Information from this study is being used by the CCC and the BCDC in the biennial revisions of their designated areas and by the CEC in its continuing planning for the state's electrical-generating supply needs.

THIS STUDY IS A PRELIMINARY ANALYSIS OF EXISTING POWER PLANT EXPANSION OPPORTUNITIES; IT DOES NOT IDENTIFY OR SELECT SITES FOR EXPANSION. ACTUAL EXPANSION OF THE ELECTRICAL-GENERATING CAPACITY AT ANY OF THE EXISTING SITES WOULD REQUIRE ADDITIONAL DETAILED STUDIES AND REVIEW BY THE CEC FOR CERTIFICATION TO CONSTRUCT AND OPERATE.

The study examines expansion opportunities at 25 coastal zone power plant sites. Eighteen of the sites are in the CCC jurisdiction, five in that of the BCDC, and two lie just outside the legally-defined coastal zone lines. The effects on expansion opportunities of 27 environmental and technical siting factors and three institutional factors--the Federal Power Plant and Industrial Fuel Use Act (PIFUA), the CEC 1979 Biennial Report (BR) supply criteria, and state nuclear waste disposal requirements (PRC Section 25524.2)--are analyzed to determine their impact on the study's results.

Five types of plants--nuclear, direct-fired coal, oil-or gas-fired steam turbine, combined cycle, and combustion turbine--are examined in conjunction with six fuel types--uranium, coal, oil, natural gas, methanol, and coal gas.

Three plant sizes are considered for each type of plant: small (70-400 MW), medium (500-800 MW), and large (1,200-1,300 MW). The study does not include an economic analysis in its examination of expansion opportunities.

Results

Expansion opportunities for various combinations of plant types and sizes appear to exist at 20 of the 25 sites. In many cases, the existence of natural or manmade constraints will require trade-offs or mitigation to offset the effects of adverse impacts. Expansion opportunities do not exist at five sites. These results are summarized in Table i on the following page, and in Table 12 on page 101.

Overall, the most consistently severe constraint to expansion opportunities is the lack of available land. Twenty-one of the 25 sites are severely constrained by the impingement of adjacent residential and industrial development, although expansion opportunities still exist at these sites. The exceptions to this constraint are sites located in predominantly rural areas where large amounts of undeveloped land are contiguous to the site boundaries.

The lack of air quality trade-offs is also a significant constraint to expansion opportunities. Ambient air quality standards are generally violated more often in urban than in rural areas. Expansion opportunities are further limited in urban areas since fewer trade-offs are available due to recent efforts to reduce pollution from existing sources.

Availability of once-through cooling water supplies from the ocean is a primary consideration in siting power plants on the coast. Fourteen of the 25 sites are located on enclosed bodies of water where expansion using once-through cooling processes are constrained or precluded due to thermal effects of discharge. Since only 11 of the sites are located to permit convenient use of ocean water for once-through cooling, this constraint is a notable limitation to coastal zone expansion opportunities. The potential to augment cooling water sources with municipal waste water supplies is limited by the volumes available, the level of treatment and the potential health impacts. The lack of available land becomes even more important at many sites when land intensive closed-loop cooling systems and air quality control technology systems are added. More space would be required for control systems on sites where space for normal expansion is already severely constrained.

Expansion opportunities for nuclear power plants are limited to the Diablo Canyon site. Maximum credible rock acceleration of .75g at this site indicates that, technically, nuclear expansion opportunities exist. However, the actual determination of expansion at the site is dependent on further review of off-shore fault hazards by the Nuclear Regulatory Commission (NRC). This study's conclusion of the existence of nuclear expansion opportunities at Diablo Canyon neither advocates nor disfavors licensing or expansion. Such an action will require more extensive engineering and economic analyses which are not within the scope of this study. Nuclear expansion opportunities are foreclosed at all other sites, including Humboldt Bay and San Onofre, by a combination of geological hazards and population influence zone density criteria.

The limitations of PIFUA on oil and gas fuels used in power plants will further limit expansion opportunities of steam turbine and combined cycle plants until

TABLE 1: RANGE OF EXPANSION OPPORTUNITIES BY TECHNOLOGY

TECHNOLOGY / SITE / FUEL	STEAM TURBINE (BASELOAD)			COMBINED CYCLE (BASELOAD)	COMBUSTION TURBINE (PEAKING)
	NUCLEAR	COAL	NATURAL GAS, OIL COAL GAS, METHANOL	NATURAL GAS, OIL COAL GAS, METHANOL	NATURAL GAS, OIL COAL GAS, METHANOL
HUMBOLDT	- 0 -	100	150	- 0 -	70 - 560
MOSS LANDING	- 0 -	100 - 500	150 - 800	400 - 1300	70 - 560
MORRO BAY	- 0 -	- 0 -	150	400	70
DIABLO CANYON	100 - 1200	- 0 -	- 0 -	- 0 -	- 0 -
MANDALAY	- 0 -	100	150 - 800	400 - 1300	70 - 560
ORMOND BEACH	- 0 -	100 - 500	150 - 800	400 - 1300	70 - 560
SCATTERGOOD	- 0 -	- 0 -	150	- 0 -	70
EL SEGUNDO	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -
REDONDO	- 0 -	- 0 -	- 0 -	- 0 -	70
HARBOR	- 0 -	- 0 -	150	400	70 - 560
LONG BEACH	- 0 -	- 0 -	150	- 0 -	70 - 560
ALAMITOS	- 0 -	- 0 -	150	- 0 -	70 - 560
HAYNES	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -
HUNTINGTON BEACH	- 0 -	100	150 - 800	400 - 1300	70 - 560
SAN ONOFRE	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -
ENCINA	- 0 -	100	150 - 800	400 - 1300	70 - 560
STATION B	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -
SILVERGATE	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -
SOUTH BAY	- 0 -	- 0 -	- 0 -	- 0 -	70
CONTRA COSTA	- 0 -	- 0 -	- 0 -	- 0 -	70 - 560
PITTSBURG	- 0 -	- 0 -	- 0 -	- 0 -	70 - 560
OLEUM	- 0 -	- 0 -	- 0 -	- 0 -	70 - 560
OAKLAND	- 0 -	- 0 -	- 0 -	- 0 -	70
POTRERO	- 0 -	- 0 -	- 0 -	- 0 -	70
HUNTERS POINT	- 0 -	- 0 -	- 0 -	- 0 -	70 - 500

synthetic fuels, such as methanol, are available on a reliable basis. The CEC 1979 BR supply criteria promote the use of alternative technologies, such as geothermal, cogeneration, hydroelectric, wind and solar, and the use of clean synthetic and coal fuels. The state's nuclear waste disposal requirements will limit nuclear expansion opportunities.

Recommendations

In this report, the CEC staff recommends the following actions to support the results and conclusions of this study.

The CCC and the BCDC should:

- Not "designate" sites where expansion opportunities do not currently exist.
- Incorporate the results of this study into local coastal programs (LCPs).

The CEC should:

- Continue studies of new siting opportunities in the undesignated areas of the coast.
- Continue studies on the use of municipal waste water to augment coastal zone power plant cooling processes.
- Initiate synthetic fuel repowering studies.
- Initiate synthetic fuel production facility siting studies.
- Work with local planners and decision makers responsible for the LCPs.

The utilities should:

- Conduct more detailed expansion studies based on the results of this preliminary study.
- Conduct additional detailed conventional repowering studies at existing coastal zone power plants.

Cooling Water supplies are readily available for once-through cooling but are considered to be limited by entrainment impacts. Secondary-treated waste water supplies exist; some are reclaimed.

Available Land is not a constraining factor at this site. Clearly, large amounts of open space are available off-site. Constraints to expansion are due primarily to air quality impacts. Approximately 20 acres of bluff and bluff top terrain on the sites southwestern corner would be available for on-site expansion.

CCC Designations

CCC public park designations abut the entire length of both the north and south plant boundaries. Given other existing constraints, and the availability of acreage on-site, these designations are not considered to affect reasonable expansion opportunities. Additional review of the adequacy of these designations should be predicated on review of nuclear siting safety factors.

ENCINA

The Encina power plant (SDG&E) site is located on the southern bank at the mouth of Aqua Hedionda Lagoon in the City of Carlsbad (San Diego County). Five fossil-fueled combustion turbine units, rated at a total capacity of 883 MW, are in operation.

The 688-acre site is bounded by I-5 on the east and the Pacific Ocean on the west. A variety of residential, commercial, recreational, and agricultural uses are scattered in the surrounding area and abut the northern and southern property lines. The actual property boundaries overlap the mouth of the lagoon to the north bank proper. The City of San Diego lies approximately 30 miles southward. A variety of developing urban land uses and densities stretch inland along state route 78 for 10 to 15 miles to the foothills of the Merriam Mountains.

A Coastal Commission partial designation delineating public park area abuts the site's northern boundary at the beach. Agricultural use and park acquisition designations are near (one-quarter mile) the southern property line.

Nuclear expansion opportunities do not exist due to density criteria of population influence zones, urban, and park and recreational impacts. The presence of quaternary faults within five miles represents a severe constraint.

Coal expansion opportunities are limited to a small facility (100 MW) by the lack of adequate air quality trade-offs. View protection, cultivated agricultural land, urban areas, park and recreation, endangered animal habitats, and natural area impacts are all severe, but not prohibitive, constraints.

Steam Turbine expansion opportunities exist for all plant sizes (150-800 MW) and fuel type. Urban areas, available land, endangered animal habitat, and natural area impacts are all severe, but not prohibitive, constraints.

Combined Cycle expansion opportunities exist for facilities of all sizes (400-1,300 MW) and fuel types. Urban areas, available land, endangered animal habitat, and natural area impacts are all severe, but not prohibitive, constraints. Repowering opportunities are limited due to the relatively recent installation of all units.

Combustion Turbine expansion opportunities exist for all plant sizes (70-560 MW) and fuel types. Available land and endangered animal habitat impacts are all severe, but not prohibitive, constraints.

Cooling Water supplies for once-through cooling are readily accessible, but current intake locations may limit expansion. Unreclaimed, primary-treated waste water is also accessible.

Available Land constraints limit lateral expansion opportunities. Expansion opportunities exist on agricultural land owned by SDG&E inland of I-5. Urban land use encroachment is the primary contributor to reduction of availability of land.

CCC Designations

A CCC partial designation delineating public park area abuts the northwest corner of the site; agricultural use and park acquisition designations abut the southeast corner. These designations do not affect reasonable expansion opportunities at this site. Constraints to expansion opportunities are due to effects of other conventional siting factors, as noted; primarily, the effects of urban land use encroachment on available land.

Station B

The Station B power plant (SDG&E) is located on the inner shore of San Diego Bay, two blocks inland from the Broadway Pier in the City of San Diego (San Diego County). Five fossil-fueled steam turbine units, rated at 87 MW total operating capacity, are on-site.

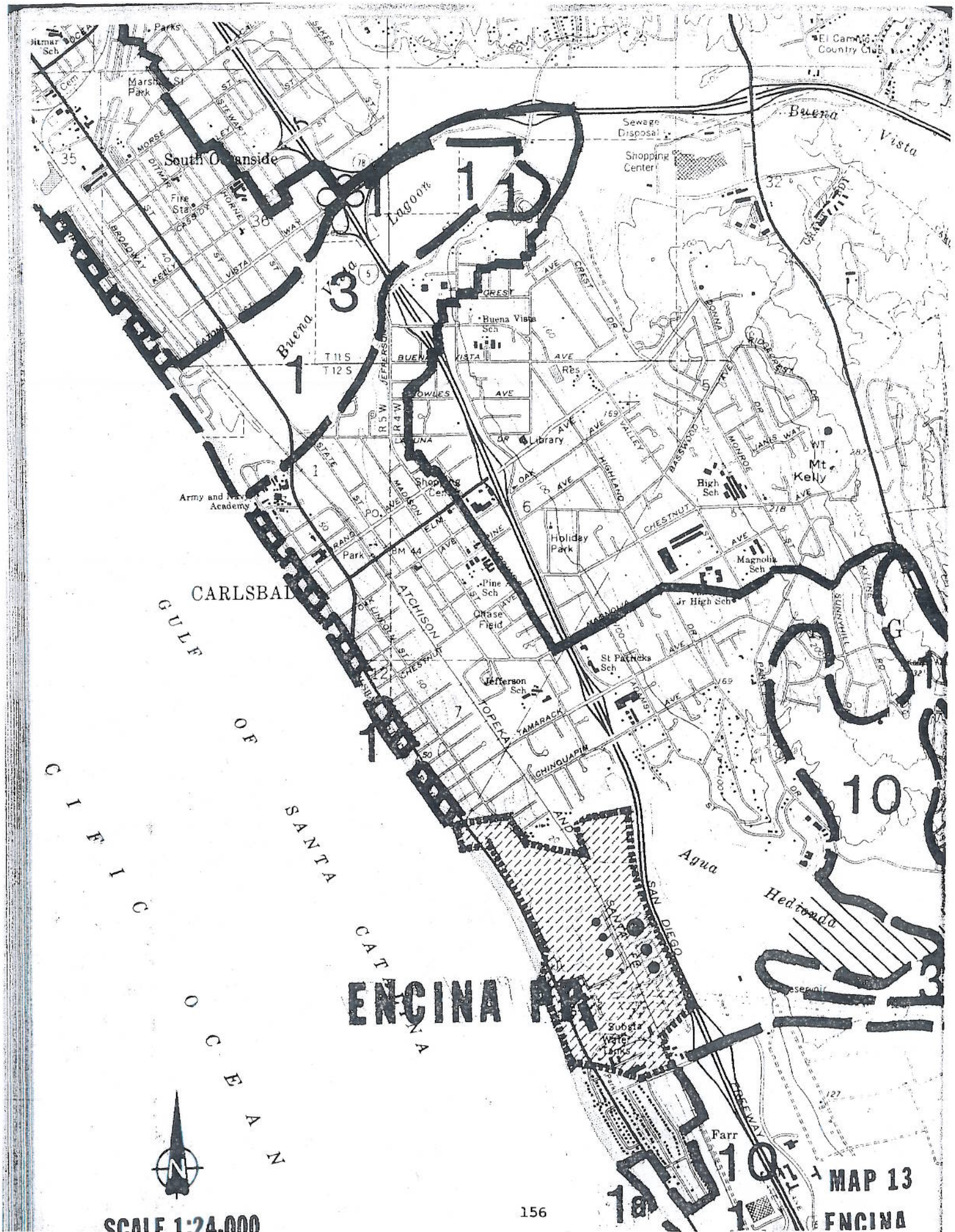
This small 1.5-acre site is bounded on the north by Broadway, on the east by Ketner Avenue, on the south by "E" Street and on the west by the AT&SF railroad. Surrounding areas are used for a wide variety of harbor-related industrial and commercial activities. San Diego International Airport (Lindbergh Field) lies approximately one mile north.

Approximately one mile to the southwest, a large portion of the Coronado Peninsula is designated as a recreation area by the Coastal Commission. This area is separated from the site by San Diego Bay. There are no designated areas near the site.

Nuclear expansion opportunities do not exist due to the lack of available land and urban area impacts. The presence of quaternary faults within five miles is a severe constraint.

Coal expansion opportunities do not exist due to the lack of available land and urban area impacts. Air quality trade-offs would limit expansion to a small facility (100 MW).

Steam Turbine expansion opportunities do not exist due to the lack of available land. Air quality trade-offs would provide for all plant sizes (150-800 MW) for all fuel types. Urban area and military base impacts are all severe, but not prohibitive, constraints.


South Oceanside
Marshall St Park
Fire Sta
Sewage Disposal
Shopping Center
El Camino Country Club
Buena Vista
Lagoon
Buena Vista Sch
Res
Library
Shopping Center
Army and Navy Academy
Park
Holiday Park
High Sch
Mt. Kelly
Magnolia Sch
Jr High Sch
Pine Sch
Chase Field
St Patricks Sch
Jefferson Sch
CARLSBAD
GULF OF SANTA CATALINA
PACIFIC OCEAN
ENCINA
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