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December 20, 2013

VIA E-FILING

El Segundo Energy Center Petition to Amend (00-AFC-14C)
Craig Hoffman, Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

Re: El Segundo Energy Center Petition to Amend (00-AFC-14C)
Cultural Resources Data to Supplement Responses to Data Requests 81 and 82

Dear Mr. Hoffman:

El Segundo Energy Center LLC ("**ESEC LLC**") hereby submits the enclosed Historical Resources Inventory and Evaluation Update Report and related Cultural Resources information to supplement its responses to Data Requests 81 and 82 of Data Request Set 1. ESEC LLC's September 12, 2013 responses to Data Requests 68 through 82, which were docketed at the California Energy Commission under an Application for Confidential Designation of Cultural Resources, remain confidential. The enclosed data, however, is not confidential. Please contact me or my colleague Allison Harris if there are questions about the enclosures.

Locke Lord LLP

By: John McKinsey
John A. McKinsey
Attorneys for El Segundo Energy Center LLC

JAM:awph

Enclosures

El Segundo Energy Center
Petition to Amend

(00-AFC-14C)

Cultural Resources Data Responses

(Supplemental Responses to CEC Data Requests 81 and 82)

Submitted to

California Energy Commission

Prepared by

El Segundo Energy Center LLC

With Assistance from

CH2MHILL®

2485 Natomas Park Drive
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Sacramento, CA 95833

December 19, 2013

Contents

Introduction

Attached are El Segundo Energy Center LLC's (ESEC LLC) supplemental responses to California Energy Commission Staff's (Staff) Cultural Resources Data Requests 81 and 82 for the El Segundo Energy Center (ESEC) Petition to Amend (00-AFC-14C).

Supplemental Cultural Resources Data Responses

The following responses provide additional data to satisfy Staff's Data Requests 81 and 82, received on August 12, 2013.

DATA REQUEST

81. It appears that the proposed project components as described in the 2013 PTA would all fall within the previously surveyed areas of the JRP report. Please provide a figure that shows an overlay of the proposed amendment onto Figure K-1 of the JRP report.

Response: As requested, Figure DR81-1 of these Supplemental Responses shows the PTA project area of analysis (PAA) overlaid on Figure K-1 from Appendix K of the 2000 *El Segundo Power Redevelopment Project Historic Resources (Built Environment)* report prepared by JRP Historical Consulting, LLC (JRP) (referred to as "Figure K-1 of the JRP report" in Staff's data request).

DATA REQUEST

82. Please provide an update to the JRP report that includes the condition of any previously identified historic-age resources (e.g., extant, demolished, modifications) and evaluations for any built environment resources that have become historic-age since 2000 (i.e., any resource built in, or prior to, 1968).

Response: In December 2000, JRP prepared the *El Segundo Power Redevelopment Project Historic Resources (Built Environment)* report, which included the aforementioned Appendix K, "*Historic Evaluation of the El Segundo Generating Station, El Segundo, Los Angeles County, California*" (October 2000). The generating station was built between the mid-1950s and mid-1960s, and was not yet 50 years old in December 2000.

In response to Staff's request, ESEC LLC directed JRP to conduct an updated built-environment survey to evaluate the power plant's historical significance and integrity under National Register of Historic Places (NRHP) and California Register of Historical Places criteria. JRP conducted fieldwork at the ESEC on November 25, 2013, and in December 2013 prepared the *Historical Resources Inventory and Evaluation Update Report* included as Attachment DR82-1 to this Supplemental Response. JRP's December 2013 report updates its October 2000 evaluation and applies standard NRHP criteria for properties 50 years old or older. The 2013 report also documents alterations to or demolitions at the power plant since 2000. JRP concluded that the facility does not meet the NRHP criteria and was not exceptionally significant within the "context of the development of the Southern California Edison system, nor as an example of a steam power plant from the post-war era." (December 2013 JRP Report, page i.) The facility also does not meet the criteria for listing in the California Register of Historic Resources. Consequently, it is not a historical resource for purposes of the California Environmental Quality Act.

FIGURE DR81-1
ESEC PTA PAA Boundary Overlay
El Segundo Power Facility Modification
El Segundo, California

Basemap source: URS Corporation. 2000. ESPRP Historic Resources (Built Environment) Appendix K. Figure K-1. December.

ES080813223057SCO El_Segundo_DR-81_PTA_PAA footprint.ai 12/13

CH2MHILL.

Attachment DR82-1
Historical Resources Inventory and Evaluation Update Report dated December 2013

HISTORICAL RESOURCES INVENTORY AND EVALUATION UPDATE REPORT

for the

El Segundo Energy Center
El Segundo Energy Center Petition to Amend (00-AFC-14C)
El Segundo, California

Prepared for:
CH2M HILL
402 W. Broadway, Suite 1450
San Diego, CA 92101

Prepared by:

JRP Historical Consulting, LLC
2850 Spafford Street
Davis, California 95618

December 2013

SUMMARY OF FINDINGS

CH2M HILL contracted with JRP Historical Consulting LLC (JRP) to prepare this Historical Resources Inventory and Evaluation Update Report for historic buildings, structures, and objects located within the study area for this project defined as the El Segundo Energy Center (ESEC) property in El Segundo, Los Angeles County, California.

JRP previously prepared a historic resources evaluation for this property in October 2000 entitled "Historic Evaluation of the El Segundo Generating Station, El Segundo, Los Angeles County, California."[1] The station was built between the mid-1950s and mid-1960s and was not yet 50 years old at the time of the evaluation. As such, JRP evaluated the property under National Register of Historic Places (NRHP) Criterion Consideration G, which allows for evaluation of properties less than fifty years old for "exceptional importance." JRP concluded that the station did not meet this criterion and was not exceptionally significant within the "context of the development of the SCE, nor as an example of a steam power plant from the post-war era."[2] This report updates the 2000 report and applies standard NRHP Criteria for properties 50 years old or older. This report also documents alterations or demolitions to the property since 2000.

The purpose of this document is to comply with the California Environmental Quality Act (CEQA), as it pertains to historical resources, and to assess whether the architectural resources located within the project study area should be considered historical resources for the purposes of CEQA; that is, whether they are listed in, determined eligible for, or appear eligible for listing in the California Register of Historic Resources (CRHR). JRP has also included an analysis of their eligibility under NRHP criteria. This study was conducted in accordance with 36 CFR 800 relating to implementation of Section 106 of the National Historic Preservation Act and Section 15064.5(a)(2)-(3) of the CEQA Guidelines using the criteria outlined in Section 5024.1 of the California Public Resources Code. This report concludes that the El Segundo Energy Center does not appear to meet the criteria for listing in the NRHP or the CRHR and thus does not qualify as historical resources for the purposes of CEQA.

Appendix A includes a project vicinity map, location map and site map. The DPR 523 form is in **Appendix B** and JRP's 2000 report for the El Segundo plant is in **Appendix C**.

[1] JRP Historical Consulting Services, "Historic Evaluation of the El Segundo Generating Station, El Segundo, Los Angeles County, California," October 2000.
[2] NPS, "Guidelines for Evaluating and Nominating Properties that Have Achieved Significance Within the Past Fifty Years," *National Register Bulletin No. 22* (Washington, D.C.: GPO, revised 1996).

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ATTACHMENTS

1. NEED FOR REPORT

This report is being prepared to assist the property owner, El Segundo Energy Center, LLC, fulfill a data request by the California Energy Commission (CEC) in response to the El Segundo Energy Center Petition to Amend (00-AFC-14C). In Data Request 82, CEC staff requested an update to a 2000 JRP report that would include any previously identified historic age resources and evaluations for any built-environment resources that have become historic-age since 2000 (i.e., any resource built in or prior to, 1968).[3] CEC requested that the update to the JRP 2000 technical report include consideration of the now approximately 49-year old ESGS Unit 3 & 4 structures in light of any additional research and evaluations that have been completed since 2000.

[3] JRP Historical Consulting Services, "Historic Evaluation of the El Segundo Generating Station, El Segundo, Los Angeles County, California," October 2000.

2. RESEARCH AND FIELD METHODS

JRP conducted fieldwork at ESEC on November 25, 2013. JRP staff historian / architectural historian Steven J. Melvin was escorted during the site visit by on-site environmental compliance manager Scott Seipel. The fieldwork consisted of a comprehensive tour of the property in which all of the buildings and structures 50 years old or older were viewed, photographed, and recorded. In conducting background research for this project, JRP reviewed the 2000 report and evaluation of the El Segundo plant. JRP also reviewed other reports and evaluations of power plants similar to El Segundo Units 3 and 4.

The historic themes are discussed in Section 3. The description and historical evaluation of the property is summarized in Sections 4 and 5. Refer to Section 6 for JRP staff professional qualifications, and to the references listed in Section 7 for a complete listing of materials consulted.

3. HISTORICAL OVERVIEW[4]

The El Segundo Energy Center is located along the Pacific Ocean in the city of El Segundo. It was built by the Southern California Edison Company (SCE) in the 1950s and 1960s, with two units coming on-line in 1955 and 1956 (demolished) and another two in 1964 and 1965. This section presents a historic background to provide a basis for evaluating facility for historic significance within the context of the history of SCE, and the oil and gas-fired steam electric generation in California. The section also includes a brief summary of the history of the El Segundo station.

3.1. Early California Electrical Generation

Electrical generation in California faced two major problems, securing inexpensive motive force for the generators and transmitting the power to often distant users. California's first electric light glowed in September 1879, when the California Electric Light Company of San Francisco installed a Brush arc light system powered by a steam engine for street lighting. It was costly to run because fuel for its steam engine was expensive. Another source of motive force, hydropower, was available in the Sierra Nevada and had been developed by miners. In fact in 1879, the same year the California Electric Light Company of San Francisco began operations, the Excelsior Water and Mining Company installed its own Brush lighting system. The water driven wheels were inexpensive to operate, but the plant was located far from population centers, and a method for transmitting electric power over long distances had not yet been developed. As a result, the company only produced electricity for its own use.

Even with the twin problems of motive force and transmission, southern California soon began experimenting with electric lighting. George Chaffey was the first to generate electricity in southern California in December of 1882. He purchased a small direct current generator and installed an arc light outside the Garcia ranch, where he and his brother had organized the Etiwanda Colony.[5] The canal did not provide much power, and he could not transmit the power very far. At about the same time, commercial generation began in Southern California. The Los Angeles Electric Company installed Brush street lamps in Los Angeles. Using steam power they could light the city, but again it was expensive because coal and hardwood for the boilers had to be transported long distances to the plant.

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[4] This text draws from several JRP reports related to electrical generating facilities, including: "Historic Evaluation of the El Segundo Generating Station, El Segundo, Los Angeles County, California," October 2000; "Historic Resources Inventory and Evaluation Report for the Proposed Etiwanda Expansion Project." 2007; Highgrove Generating Station DPR 523 Form, 2006; South Bay Power Plant DPR 523 Form, 2006.

[5] Donald L. Clucas, *Light Over the Mountain: A History of the Rancho Cucamonga Area* (Upland, California: California Family House Publishers, 1979) 214.

Several smaller communities followed after and faced the same problems. Visalia and Santa Barbara installed steam powered systems, but these also proved expensive. Visalia's first plant was forced to close when customers objected to the high prices and unsuitable light. The little hydroelectric plant at Highgrove, on the other hand, was located close enough to provide street lighting to Riverside. It used a low head hydropower site that was able to power 15 arc lamps. Hydropower plants located near users were rare.

The transmission problem was a result of the nature of direct current. Resistance in the wires diminished the amount of electricity received at the user's end, and reduced the distance electricity could be transmitted. Higher voltages reduced the resistance, but were not useful to customers. Alternating current systems, developed by Nicola Tesla and William Stanley and sold by Westinghouse, simultaneously solved the transmission and generation problems. Alternating current systems could be "stepped up" to higher voltages for transmission and back down to useable voltages for distribution by transformers, making it possible to transmit electricity over longer distances. With longer transmission distances, companies could begin to build hydropower plants at a distance from the markets they served.

At first, companies simply used alternating current to enlarge their market area and to provide new services. In the 1890s four early systems, Santa Barbara, Highgrove, Visalia and Pasadena, changed from direct current to alternating current without changing their generation sources. The first model for future generation was the San Antonio Light and Power Company. In 1891 Dr. Cyrus Grandison Baldwin had located an excellent hydropower site 14 miles from Pomona at the San Antonio Canyon. Baldwin hired Almarian William Decker engineer the hydroelectric plant, and formed San Antonio Light and Power Company to develop the site. Decker successfully designed a single-phase alternating current system that began operations in 1892. It was able to provide 120 kW of power, compared to Highgrove's 75 kW.[6] Decker immediately began work on another power plant at Mill Creek which introduced the three phase alternating current to California. This plant produced even more power, 250 kW.[7] These hydroelectric projects proved that power could be transmitted longer distances and increased available power. They also proved to be the most economical means of generation at the time.

3.2. Twentieth Century Power Generation in California

Throughout the early twentieth century, however, companies began to reduce their dependence on steam power as they built larger hydroelectric plants, and hydroelectricity dominated electrical generation. In 1920, hydroelectric power accounted for 69 percent of all electrical power generated in California. In 1930, that figure had risen to 76 percent; it rose again to 89

[6] William A. Meyers, *Iron Men and Copper Wires: A Centennial History of the Southern California Edison Company* (Glendale, California: Trans-Anglo Books, 1983) 25.
[7] Meyers, *Iron Men and Copper Wires, 27.*

percent in 1940. By this time, however, essentially all of the practical sites for hydroelectric generation had been developed. After World War II, companies began constructing steam plants and the prominence of hydroelectricity began to wane. By 1950, hydroelectricity accounted for 59 percent of the total, a figure that fell to only 27 percent in 1960. Some new hydroelectric plants were built during the 1960s, chiefly associated with federal and state water projects, but by 1970, hydroelectric generation still accounted for only 31 percent of all electricity generated in California.[8]

The statewide trend from hydroelectric to steam powered is reflected in the activities of such companies as Southern California Edison (SCE) and Pacific Gas and Electric Company (PG&E). At the start of World War II, SCE had only one steam powered facility, its plant at Long Beach on Terminal Island. It was, however, a massive operation, with eleven units on-line. These units had been constructed in stages, beginning in 1911. The first three units, completed by 1917, originally burned a heavy fuel oil. These units performed yeoman duty during the drought of the 1930s. New units were added throughout the 1920s and 1930s; nine units were in place by the mid-1930s.[9]

SCE made massive new investments in steam power in the two decades after World War II, as electrical supplies fell far short of demand. The company was not alone in this regard. PG&E made similar investments in steam plants throughout Northern California because it too had exhausted the supply of usable hydroelectric sites.[10] These two companies built most of new steam generation plants in California, although smaller entities such as Los Angeles Department of Water and Power (LADWP), California Electric Power Company, and San Diego Gas and Electric (SDG&E) built plants as well. The facilities relied upon proven technologies, and were assembled quickly and inexpensively, relative to earlier plants. In a detailed article in 1950 in *Civil Engineering*, I.C. Steele, Chief Engineer for PG&E, summarized the design criteria that went into construction of four major steam plants the company had under construction at that time, at Moss Landing, San Francisco, and in Contra Costa County and Kern County. These plants had much in common with each other, he argued, and with other steam plants under construction in the state. The design criteria were the same in all cases: build the facility close to load centers to reduce transmission costs; be close to fuel supplies; be near a water supply; and be on a site where land was cheap and could support a good foundation. In another article in *Transactions of the ASCE*, Walter Dickey, an engineer from Bechtel, detailed the reasons for the boom in steam plant building postponements caused by World War II, lack of economical hydroelectric sites, and needed support of peak load periods. He compared steam generation plant with hydroelectric plants and found steam favorable. Virtually all of the plants in the

[8] James C. Williams, *Energy and the Making of Modern California* (Akron, Ohio: University of Akron Press, 1997), 374.
[9] Myers, *Iron Men and Copper Wires*, 49.
[10] Williams, *Energy and the Making of Modern California*, 257.

1950s and 1960s were designed to be expanded if market conditions warranted -- and most of them were. [11]

The decades between 1950 and 1970 were the period of peak expansion of steam generating capacity for both SCE and PG&E, as well as for smaller utility companies. During this period, SCE built a series of very similar steam plants in the Los Angeles Basin and in San Bernardino County. In 1952, the company began work on Redondo No. 2, which was adjacent to an earlier plant at Redondo Beach. In 1953, the Etiwanda plant went online, followed in 1955 by El Segundo, Alamitos in 1956, and Huntington Beach and Mandalay in 1958. By 1960, all SCE plants either had multiple units or had additional units in the planning stages. In 1950 PG&E operated 15 steam electric plants in California, and during the following decade added several new plants and expanded older ones. Chief among these were the Kern plant (1948-50), Contra Costa (1951-53), Moss Landing (1950-52), Morro Bay (1955), Hunters Point (addition 1958), Humboldt Bay (1956-58), and Pittsburg (1959-60). The Pittsburg plant was at the time of its construction the largest steam station in the west, with a capacity of over 1,300,000 kW in 1960. The LADWP system was much smaller than those of SCE and PG&E, consisting of five steam plants by 1962. In addition to its Seal Beach Plant (1925-28), and Harbor Plant on Los Angeles Harbor (1943) these included the Valley Plant (San Fernando Valley, 1954), Scattergood (1958), and Haynes (1961). SDG&E had three steam-electric power plants, Silver Gate (1943), Encina (1954), and South Bay (1960). By the late 1970s, there were more than 20 fossil fuel thermal plants in California, clustered around San Francisco Bay, Santa Monica Bay, and in San Diego County, along with a few interior plants in San Bernardino County and Riverside and Imperial Counties, as well as a few plants on the Central Coast. [12]

3.3. History of the Southern California Edison Company

SCE began in 1896 as the West Side Lighting Company in Los Angeles, California. The company was one of several attempting to enter the Los Angeles market. It could not freely run wires without a city franchise, so the company built its steam plant outside the city limits and ran its lines into the city using poles on private property. Walter S. Wright, one of the founders, located and purchased a franchise, but the terms required the company to light city hall by April 5, 1896. The company rushed to meet the terms, and won the franchise to begin freely supplying electricity in the city.

[11] I.C. Steele, "Steam Power Gains on Hydro in California," *Civil Engineering* (January 1950): 17-21; Edgar J. Garbarini, "Design Saves Construction Dollars on Contra Costa Power Plant," *Civil Engineering* (May 1953): 31-33; Walter L. Dickey, "The Design of Two Steam Electric Plants," *ASCE Transactions* (1956): 253-273.
[12] Annual Reports of the Southern California Edison Company, various years. R.W. Spencer, "Cooling Water For Steam Electric Stations in Tidewater," *Transactions of the American Society of Civil Engineers* 126 (1961): 280-302; I. C. Steele, "Steam Power Gains on Hydro in California," 17-19; Dickey, "The Design of Two Steam Electric Plants," 253-255; *Southwest Builder and Contractor*, "Haynes Steam Plant Will Grow With Demand," *Southwest Builder and Contractor* (October 12, 1962): 24-27; Williams, *Energy and the Making of Modern California*, 257.

City ordinances provided another challenge to the company. All the new technology, telephones, electric railroads, fire call boxes and more, had created a tangle of wires along the street. All new wires were required to be placed underground. West Side Lighting determined that the Edison three-wire system would provide the best underground system. Unfortunately, the Los Angeles Edison Electric Company held the rights to use the system in Los Angeles but had not developed any facilities. In 1897 West Side Lighting purchased the Los Angeles Edison Electric and became Edison Electric Company of Los Angles. Using the new three-wire system to install underground conduit downtown, the company gained new customers. In 1898 the company built a second steam-powered plant in Los Angeles to keep up with demand.

The company grew throughout the early twentieth century to emerge as the dominant utility in Southern California, achieving a presence in the southland that approximated that of the Pacific Gas & Electric Company in Northern California. Like the PG&E, SCE grew chiefly through acquisition, buying or merging with numerous pioneering electrical and gas companies in the region. Although several dozen small companies were folded into this utility, the principal assets came from three firms: Southern California Edison Co., which was organized in 1909; the Pacific Light & Power Company, organized in 1902 and which rivaled Southern California Edison when the two companies merged in 1917; and the California Electric Power Company (often called Calelectric), which combined a number of small companies in 1941 and was merged into SCE in 1964.[13]

Throughout its history, SCE and its predecessor companies have been known for technological innovation. These dozens of predecessor companies were responsible for numerous groundbreaking developments in the larger field of electric power generation. The earliest plants by predecessor companies were the previously-mentioned small steam plants in Visalia and Santa Barbara, both constructed in the mid-1880s. Within just a few years, however, various predecessor companies began building hydroelectric plants and for half a century, the SCE and its predecessors were most closely associated with innovations in hydroelectric power generation. The San Antonio Light and Power Company, for example, is widely credited with developing the first "step-up, step-down" transformers to transmit power from its plant in San Antonio Canyon. This company merged into the Pacific Light & Power Company before it was acquired by SCE. The Mill Creek plant near Redlands is regarded as the origin of three-phase alternating current transmission, creating an industry standard.[14] The Southern California Edison Company built numerous record-breaking high-head hydroelectric power facilities, including

[13] These numerous predecessor companies are shown in a chart in: William A. Myers, *Iron Men and Copper Wires: A Centennial History of the Southern California Edison Company* (Glendale, CA: Trans-Anglo Books, 1983).
[14] These pioneering plants are discussed in all major histories of the hydroelectric industry. See, for example, Norman A. F. Smith, *Man and Water: A History of Hydro-Technology* (New York: Scribner's, 1976).

two on the Kern River during the 1910s and 1920s.[15] The Pacific Light & Power Company gained international attention in the 1910s when it built its massive Big Creek Project, one of the most impressive hydroelectric power generation facilities in American history.[16] SCE continued to expand its Big Creek system through 1929. It became the largest producer for the company, making SCE highly dependent on hydroelectric power by the 1920s. It was SCE's cheapest source and allowed the company to continuously reduce rates.

Given this massive investment in hydroelectric plants, SCE and Calelectric relied principally upon hydroelectric power to satisfy the demands of its customers, at least as long as it was possible to do so. William Myers, the principal historian of SCE, noted that "until World War Two, both Edison and Calelectric were predominantly hydro companies, with steam essentially used in standby service to meet peak demands or emergency situations."[17]

Hydroelectricity, however, had its limitations. Abnormally low snowfall in the mountains in 1920-1924 dramatically reduced the amount of water available to produce electricity. SCE encouraged customers to conserve, reduced electric rail routes, and brought back into service old steam powered generators, all in an attempt to maintain electrical service levels. The most successful effort was interconnecting several of the utilities. This allowed companies with surplus power to sell it to neighboring companies. After this drought, SCE and other companies that relied heavily on hydropower altered their strategy. While they continued to rely on cheap hydroelectric power, they insured they had sufficient back up sources of power to meet growing demand.

SCE had grown continuously since its inception, but during the Depression growth slowed and the company cut costs by shrinking its workforce through attrition and changing to a five-day workweek. SCE improved efficiency at existing plants and streamlined its finances, using lower interest rates to reduce outstanding bonds from its long period of growth and expansion. Reduced energy use and new plants that came online just before the Depression gave SCE an electricity surplus. As a result, the company reduced rates and encouraged increased electrical use. Company employees toured SCE's service areas demonstrating new electrical appliances in an effort to increase power use. Increased consumer demand for these appliances also led to higher demand by manufacturers of those products. SCE's program worked, and when the company received electricity from Hoover Dam in 1939 it had a ready market to buy the power.

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[15] Stephen D. Mikesell, "Historic Resource Evaluation Report, Kern River No. 1 Power House," prepared for the California Department of Transportation, August, 1988; Stephen D. Mikesell, "Kern River No. 3 System," National Register of Historic Places Registration Form, July 28, 1989, prepared for Entrix, Inc., and the Southern California Edison Company.
[16] Numerous histories exist for the Big Creek project, including: David H. Redinger, *The Story of Big Creek* (Los Angeles: Angelus Press, 1952).
[17] Myers, *Iron Men and Copper Wires*, 208.

World War II further increased the demand for electricity as manufacturers moved to the area to meet war needs. This transformation was especially notable in the Los Angeles Basin, where aircraft manufacturers and other war-related industries induced a dramatic growth in the population and economy of the region. This trend did not subside with the end of the war. Indeed, the population of the basin grew even faster during the late 1950s than it had during the 1940s. The result was a steady increase in the demand for electricity and SCE became the fastest growing utilities in the nation during the early post-war era.[18]

SCE built and expanded several plants between 1945 and 1970. During this rapid increase in the number of plants, their designs and technologies became fairly standardized. In 1951, SCE broke ground on a plant at Etiwanda, planned initially for two units but with provision for expansion.[19] In 1952, it began work on Redondo No. 2, which was adjacent to an earlier plant at Redondo Beach. Etiwanda began operating in 1953 and Redondo No. 2 in 1954. In 1955, the first unit of the El Segundo Generating Station went on-line and construction was initiated for a similar plant at Alamitos in Long Beach. In 1956, the second El Segundo unit was up and running, as was the first unit at Alamitos. The next year, the second unit at Alamitos started generating power, as did a sixth unit at Redondo. New facilities were planned that year for Huntington Beach and Mandalay, in Los Angeles and Ventura counties respectively, which both started operating in 1958. In 1959, the company added additional units at Mandalay. Expansion continued with SCE installing new units at Huntington Beach and Alamitos in 1960 and planning new units for the Etiwanda facility. This trend persisted over the next years as SCE installed new units at Huntington Beach and Alamitos, while new facilities were planned for Alamitos, Etiwanda, and El Segundo. The company put a third unit at El Segundo on-line in 1964 and fired up its fourth unit in 1965. The following year, new units were ordered for Mandalay, Alamitos, Huntington Beach, and Etiwanda.

Not surprisingly, these new units were very similar to each other in design. SCE invested hundreds of millions of dollars in this expansion and benefited from economy of scale by purchasing units that were similar, although not entirely identical. The similarity of these units is most readily apparent from the look of the plants (the general appearance of each unit is remarkably similar) and from their description in SCE annual reports. Their individual capacities, however, differed based upon the equipment installed. It appears that the company exercised its purchasing power by ordering several identical units each year. For example, in 1956, the company initiated construction on four units, one at El Segundo, two at Alamitos, and one at Redondo. The four had identical capacities (165,000 KW each) and nearly identical cost

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[18] William A. Myers, *Iron Men and Copper Wires,* 200; Big Creek was expanded in the late 1940s and early 1950s, spending about $21 million to increase the capacity by 84 MW. W. L. Chadwick, "Load Capacity of Southern California Edison Company to 2 ¾ Billion Kwhr per Year," *Civil Engineering* 20 (May 1950): 314-315.

[19] These conclusions are from the Annual Reports of the Southern California Edison Company, various years as noted in the text; JRP Historical Consulting, "Historic Resources Inventory and Evaluation Report for the proposed Etiwanda Expansion Project." 2007.

(each about $20 million). In 1958, the company installed four units (two each at Huntington Beach and Mandalay), each with an identical capacity of 200,000 KW. In 1961, the company ordered four units (one for Alamitos, two for Etiwanda, and one for El Segundo), each with an identical capacity of 310,000 KW. Similar trends prevailed in other years as well. In addition to ordering identical units each year, the general trend was toward larger and larger units, a fact that is illustrated in the four units that were installed at El Segundo.

In addition to its gas and oil-fired steam plants, SCE also made investments in nuclear power. In 1957, it built a small experimental station, called the Santa Susana Experimental Station, in Ventura County. The success of this pilot plant led the company to build the major nuclear plant at San Onofre, in cooperation with the San Diego Gas and Electric Company, which owned 20 percent. Construction began in 1963 and the plant went on-line in 1967.[20]

Deregulation of the electricity industry in the 1980s changed how power was generated and distributed and often led to separation of the two processes. SCE responded to deregulation by selling off most of its steam plants by 1997 including Huntington Beach, Redondo Beach, Barstow, Ventura, Goleta, Etiwanda, Alamitos, San Bernardino, El Segundo, Long Beach, and Oxnard. Today, it operates as a power distributor, covering most of southern California from San Onofre north to Santa Barbara on the Pacific coast, widening to include territory from Blythe in the Mojave Desert to past Bishop on the eastern side of the Sierra Nevada.[21]

3.4. History of the El Segundo Energy Center

As briefly described above, the El Segundo Energy Center was built in stages between 1953 and 1965, in the midst of a great expansion of the oil (later gas) fired steam generating capacity of the SCE. Although construction of the plant was started in late 1953, it was first mentioned in the 1954 *Annual Report*. Throughout the 1950s, SCE operated El Segundo as a two-unit station; not until the 1960s did the company plan for an additional two units there. The pertinent entry in the 1954 *Annual Report* reads: "a tidewater steam station consisting of two units, each with an anticipated rating of 160,000 kilowatts, was started at El Segundo in October 1953. The first unit is scheduled for completion in July 1955 and the second in September 1956. As its principal fuel the El Segundo station will use high viscosity fuel oil from an adjacent refinery. The station is expected to cost $45,000,000."[22]

SCE awarded the overall engineering-constructor contract for the El Segundo plant to the Bechtel Corporation of Los Angeles who acted as the field construction organization. Bechtel

[20] Myers, *Iron Men and Copper Wires*, 212.
[21] Michael Diamond, "Edison to Sell Three Inland Empire Power Plants," *San Bernardino Daily Sun* (November 23, 1996); "Edison Sells 10 Gas-Fired Plants," *Los Angeles Times* (November 25, 1997): D-2.
[22] Bechtel, "Unit No. 1, Completion Cost Report," 18; Southern California Edison, 1954 *Annual Report*, 13.

supervisors oversaw civil, mechanical, and electrical field engineering, as well as providing primary construction workers, although SCE also contracted with many other local firms for various aspects of the work. One of the first subcontractors to work on the project was Silva & Hill Construction Company who relocated Coast Boulevard (later renamed Via Del Mar Boulevard) to create more room for the plant between the beach and the bluffs below the refinery property to the east. Other major subcontractors for the project included Consolidated Western Steel Company (boiler superstructure manufacture and construction), Consolidated Chimney Company (boiler stacks), and C. C. Moore & Company (installation of steam generator). By the time SCE issued its 1955 *Annual Report*, the company stated that "the first unit at El Segundo Steam Station began commercial operation in May 1955, approximately one and one-half years after its construction commenced. The unit, which is the first of two at this location, cost approximately $24,000,000 and has an effective operating capacity of 175,000 kilowatts." Construction of Unit No. 2 dovetailed with this activity when Bechtel started the foundation work on the 165,000 KW unit in December 1954. Meanwhile, SCE was expanding other plants, such as Redondo Beach where the company installing a sixth unit at Redondo Beach.[23]

The 1956 *Annual Report* continued to treat El Segundo as a two-unit facility: "The second and final unit at El Segundo Steam Station began commercial operation in August, 1956."[24] The plant was not mentioned again until 1961. The *Annual Report* of that year noted that: "The Company has four additional steam units under construction or planned …" and listed El Segundo Unit No. 3 as a 310,000 KW facility, planned for completion in September 1964.[25] In 1962, the company announced that it was planning to install two new units (Units 3 and 4) at El Segundo in 1964 and 1965, each with a scheduled capacity of 320,000 KW. The 1963 *Annual Report* noted that the two new units were under construction, each with a scheduled capacity of 325,000 KW.[26]

Bechtel served as the engineer-constructor for the project, as it had for the first two units; likewise, some of the subcontractors chosen for work on Units No. 3 and 4 had also worked on the earlier project. For example, Clyde W. Wood & Sons won the contract for site preparation in May 1962 and soon began excavating and grading, Bechtel performed the dewatering for the seawater intake structure and oversaw the rest of the construction, while Custodis Engineering Company built the boiler stacks. Unit 3 went on-line with the noted capacity in August 1964 and the fourth unit did so in 1965 (**Illustration 1**).[27]

[23] Bechtel, "Unit No. 1, Completion Cost Report," 29-31; Bechtel, "Unit No. 2, Completion Cost Report," 15; Southern California Edison, 1955 *Annual Report*, 12.
[24] Southern California Edison, 1956 *Annual Report*, 12.
[25] Southern California Edison, 1961 *Annual Report*, 8.
[26] Southern California Edison, 1962 *Annual Report*, 8; Southern California Edison, 1963 *Annual Report*, 8.
[27] "Edison Steam Station Expands," *Southwest Builder & Contractor* (November 8, 1963): 12-15, 32.

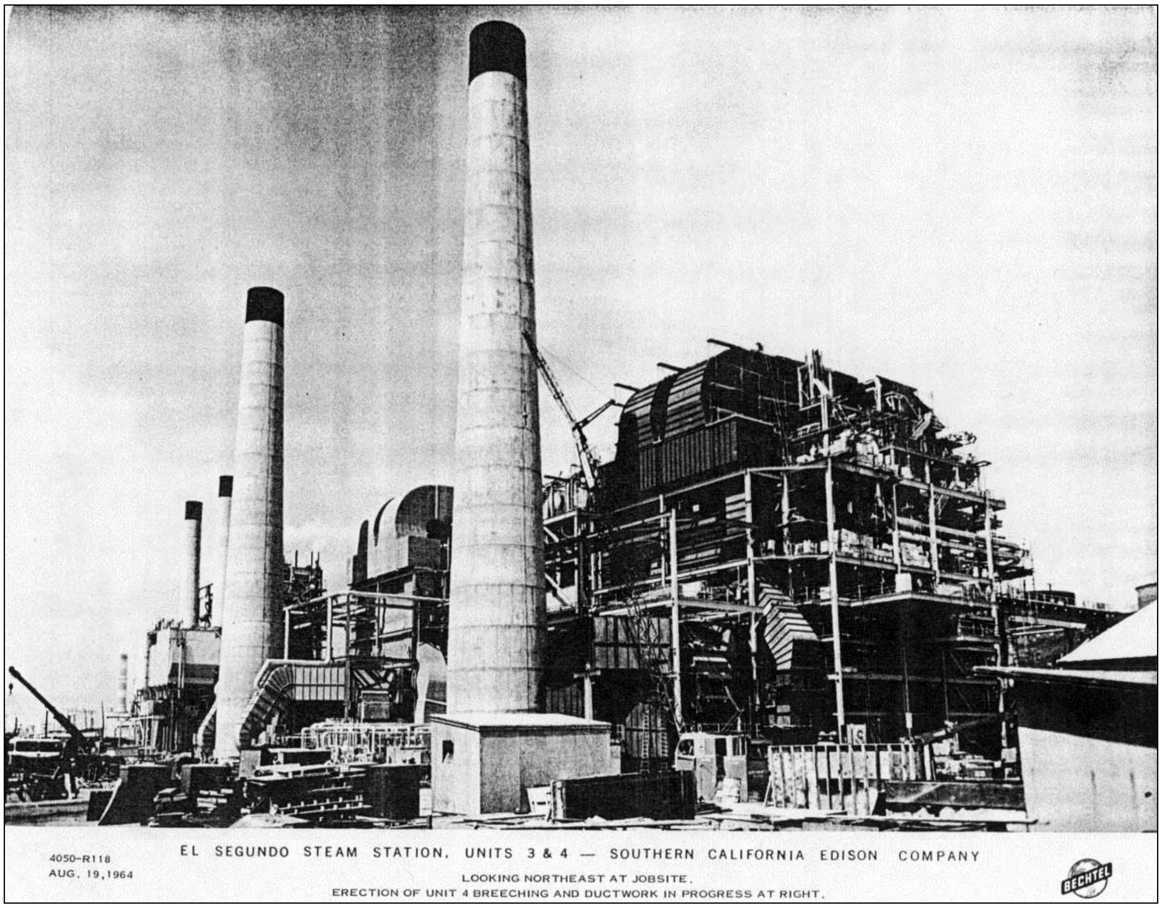

Illustration 1. El Segundo Units 3 & 4 in 1964.

The El Segundo facility has been in commercial operation since its first phase of construction in the mid-1950s. The units were all converted to natural gas during the 1970s for purposes of reducing emissions. In 1997, SCE sold the units as part of a larger program of divestiture. The current owners acquired El Segundo Station as part of a massive auction in which all but two of the SCE gas-fired steam plants were sold.[28]

[28] "Edison Sells 10 Gas-Fired Plants," *Los Angeles Times* (November 25, 1997): D-2.

4. DESCRIPTION OF RESOURCES

The El Segundo Energy Center (ESEC) is on a 24.7-acre roughly rectangular parcel bounded on the west by the Pacific Ocean and on the east by Vista Del Mar Boulevard. It is a natural gas fired generating station consisting of two boiler units — Units 3 and 4 — built in 1964 and 1965, respectively, and their associated buildings and structures (**Photograph 1**). Other buildings date to ca. 1955, when the plant was originally built. Also on the property are several buildings and structures built ca. 2013 in association with the construction of a new combined cycle generating unit located north of Units 3 and 4. The below is a table of existing buildings and structures on the property, brief descriptions and photographs. Please see the DPR 523 form attached in Appendix B for complete descriptions and additional photographs.

Table 1
Currently Existing Buildings and Structures at ESEC

Building/Structure	Date of Construction
Units 3 & 4	1964-1965
Seawater Intake for 3 & 4	1964-1965
Cutter Tank	ca. 1955
Guardhouse	ca. 1955
Retention Basins	ca. 1955
Small Storage Buildings	ca. 1955
Storage Shelter	unknown
Valve Shelter	unknown
Fuel Gas Compressor Building	ca. 2013
Temporary Administration Buildings	ca. 2013
Modern Storage Building	ca. 2000
Modern Generating Unit	ca. 2013

Units 3 and 4

Units 3 and 4 are “semi-outdoor” facilities, i.e. much of the equipment is not sheltered within a building but is supported by open steel framework (**Photograph 2**). The framework structure that supports the boiler units is about 150 feet high and the boiler stacks are about 200 feet tall. A single-story concrete block building is integrated into Units 3 and 4 behind the boiler framework (**Photograph 3**). The turbine generators are located east of the boiler units (**Photograph 4**). Above the generators, and providing access to them, is the operating deck. On the operating deck is a large gantry crane, which can be used for maintenance of either unit (**Photograph 5**).

Photograph 1. Overview of plant, camera facing north, November 25, 2013.

Photograph 2. Unit 4, camera facing northeast, November 25, 2013.

Photograph 3. Unit 4, camera facing northwest, November 25, 2013.

Photograph 4. Generators on operations deck, camera facing north, November 25, 2013.

Photograph 5. Unit 3 with traveling overhead crane and generators in foreground, camera facing northwest, November 25, 2013.

Seawater Intake for Units 3 and 4

This structure was built at the same time as Units 3 and 4. It consists of an area set about 20 feet below grade with a concrete floor and concrete walls (**Photograph 6**). This area has multiple levels joined by concrete stairs and contains various equipment including water pumps, pipes, valves, water screens and a trash rake. At ground level west of the below grade element is a large water tank, pipes and valves. The control room for the seawater intake is on the north side of the structure. It is a small concrete block building with a shed roof. Two metal personnel doors are on the south side.

Guard House

The guard house, built ca. 1955, is at the main entrance to the plant on Del Mar Vista Boulevard (**Photograph 7**). This building is made of concrete blocks with a flat roof with wide eaves. On the façade is a row of large, fixed-pane windows and decorative concrete blocks at one corner. A single metal personnel door is on the east side and two horizontal sliding windows are on the south side.

Photograph 6. Seawater intake system for Units 3 and 4, camera facing northwest, November 25, 2013.

Photograph 7. Guard House, camera facing southeast, November 25, 2013.

Other buildings and structures

Four small storage buildings, built ca. 1955, are located throughout the property. These are of nearly identical design, constructed of concrete block with slightly sloping shed roof. Three of these have a metal tilt-up door, while the fourth has a single metal personnel door (**Photograph 8**).

The cutter oil tank, built ca. 1955, is at the southern part of the parcel (**Photograph 9**). It is a large metal tank with a metal stairway attached to the side. Adjacent to the tank is an excess gas flare. Just north of this tank is the water retention basin also built about 1955 (**Photograph 10**). It is a large, open basin with sides made of built-up berms covered in asphalt. The structure is divided into two sections with the north section being the larger, primary basin. The basins are lined with a waterproof fabric.

Photograph 8. Storage building 5, camera facing southeast, November 25, 2013.

Photograph 9. Cutter oil tank and flare, camera facing south, November 25, 2013

Photograph 10. Retention basins, camera facing northwest, November 25, 2013.

5. FINDINGS AND CONCLUSIONS

5.1. Evaluation Criteria

JRP used the criteria of the California Register of Historical Resources (CRHR) and the National Register of Historic Places (NRHP) to evaluate the historic significance of the properties within the study area.

The State of California references cultural resources in the California Environmental Quality Act (CEQA—Public Resources Code (PRC) Division 13, Sections 21000-21178); archaeological and historical resources are specifically treated under Sections 21083.2 and 21084.1, respectively. California PRC 5020.1 through 5024.6 (effective 1992) creates the California Register of Historical Resources (CRHR) and sets forth requirements for protection of historic cultural resources. The criteria for listing properties in the CRHR are in Section 15064.5(a)(2)-(4) of the CEQA Guidelines, which provide the criteria from Section 5024.1 of the California Public Resources Code. The CRHR is in the California Code of Regulations Title 14, Chapter 11.5. The CRHR criteria closely parallel those of the NRHP. The eligibility criteria for listing properties in the NHRP are codified in Code of Federal Regulations 36 Part 60 and explained in guidelines published by the Keeper of the National Register.

Eligibility for listing in either the NHRP or CRHR rests on twin factors of significance and integrity. A property must have both significance and integrity to be considered eligible. Loss of integrity, if sufficiently great, will overwhelm historical significance a property may possess and render it ineligible. Likewise, a property can have complete integrity, but if it lacks significance, it is also ineligible.

Historic significance is judged by applying the NRHP and CRHR criteria. The NRHP criteria are identified as Criteria A through D, the CRHR as Criteria 1 through 4. The NRHP guidelines explain that a historic resource's "quality of significance in American history, architecture, archeology, engineering, and culture" is determined by meeting at least one of the four main criteria. Properties may be significant at the local, state, or national level:

- NRHP Criterion A (CRHR Criterion 1): association with events or trends significant in the broad patterns of our history;
- NRHP Criterion B (CRHR Criterion 2): association with the lives of significant individuals;

- NRHP Criterion C (CRHR Criterion 3): a property that embodies the distinctive characteristics of a type, period, or method of construction, represents the work of a master, or that possesses high artistic values;
- NRHP Criterion D (CRHR Criterion 4): has yielded, or is likely to yield information important to history or prehistory.

In general, NRHP Criterion D (CRHR Criterion 4) is used to evaluate historic sites and archaeological resources. Although buildings and structures can occasionally be recognized for the important information they might yield regarding historic construction or technologies, the properties within the study area for this project are building types that are well documented. Thus, these properties are not principal sources of important information in this regard.

Certain property types are usually excluded from consideration for listing in the NRHP, but can be considered if they meet special requirements in addition to meeting the regular criteria. The following are the seven Criteria Considerations that address properties usually excluded from listing in the National Register:[29]

- Consideration A: Religious Properties
- Consideration B: Moved Properties
- Consideration C: Birthplaces and Graves
- Consideration D: Cemeteries
- Consideration E: Reconstructed Properties
- Consideration F: Commemorative Properties
- Consideration G: Properties that have Achieved Significance within the Past Fifty Years

Integrity is determined under NRHP guidelines through applying seven factors to the historic resource. Those factors are location, design, setting, workmanship, materials, feeling, and association. These seven can be roughly grouped into three types of integrity considerations. Location and setting relate to the relationship between the property and its environment. Design, materials, and workmanship, as they apply to historic buildings, relate to construction methods and architectural details. Feeling and association are the least objective of the seven criteria, pertaining to the overall ability of the property to convey a sense of the historical time and place in which it was constructed.

[29] USDI, National Park Service, "How to Apply the National Register Criteria for Evaluation," *National Register Bulletin 15*, 25, 41-43; USDI, National Park Service, "Guidelines for Evaluating and Nominating Properties that have Achieved Significance within the Last Fifty Years," *National Register Bulletin No. 22* (Washington, D.C.: Government Printing Officer, 1979, revised 1990 and 1996).

The CRHR definition of integrity and its special considerations for certain properties are slightly different than those for the NRHP. Integrity is defined as "the authenticity of an historical resource's physical identity evidenced by the survival of characteristics that existed during the resource's period of significance." The CRHR further states that eligible resources must "retain enough of their historic character or appearance to be recognizable as historical resources and to convey the reasons for their significance" and it lists the same seven aspects of integrity used for evaluating properties under the NRHP criteria. The CRHR's special considerations for certain properties types are limited to: 1) moved buildings, structures, or objects; 2) historical resources achieving significance within the past fifty years; and 3) reconstructed buildings.

Under CEQA Guidelines, Section 15064.5 (a), a "historical resource" includes:

- A resource listed in or eligible for the California Register of Historical Resources;
- A resource listed in a local register of historical resources, as defined in section 5020.1(k) of the Public Resources Code or identified as significant in an historical resource survey meeting the requirements of section 5024.1(g) of the Public Resources Code;
- Any object, building, structure, site, area, place, record, or manuscript that a lead agency determines historically significant, provided the determination is supported by substantial evidence in light of the whole record;
- A resource so determined by a lead agency as defined in Public Resources Code sections 50203.1(j) or 5024.1.
- Historical resources listed in, or determined eligible for, the NRHP are automatically listed in the CRHR, Section 5024 (d)(1)(2) of the Public Resources Code.

5.2. Previous Evaluation

JRP previously evaluated the El Segundo Generating Station in 2000 and found it did not meet the criteria for listing in the NRHP or the CRHR, and was not an historical resource for the purposes of CEQA. As a property less than 50 years old at the time, JRP evaluated the station under NRHP Criteria Consideration G, which allows for evaluation of properties less than fifty years old for "exceptional importance." Under NRHP Criterion A/CRHR Criterion 1, JRP concluded that the station did not meet this criterion and was not exceptionally significant. Specifically, the station did not "appear to represent an exceptionally important property within the context of the development of the Southern California Electric Company." Additionally, the station was not "exceptionally significant within the context of steam generation plants in California, whether seen in the long history of the area, or in the more limited context of steam plants during the immediate post-war era." In terms of design (NRHP Criterion C/CRHR Criterion 3), JRP noted the "typical" nature of the El Segundo plant and concluded it did not represent "new departure in the technology of steam generation of electrical power … plant siting, foundation work, or any other aspect of power plant construction techniques.[30] JRP summarized its 2000 evaluation with the following statement:

> …the El Segundo Generating Station does not appear to represent an exceptionally significant property, whether considered within the context of the history of the Southern California Edison Company, the history of steam electrical generation, or the more limited context of steam plants built by SCE during the post-war era. Its dominant characteristic is its typicality rather than its exceptionality.

At the time of the 2000 survey, the plant had 17 built environment resources: Units No. 1 and 2, seawater intake for Units No. 1 and 2, Units No. 3 and 4, seawater intake for Units No. 3 and 4, fuel oil storage tanks, cutter tank, guardhouse, retention basin, switchyard, demineralization building, urea tanks, vehicle shelters, instrument shop, administration building, warehouse; fire equipment shed, and service water tank. The facility as it existed in 2000 is shown below in **Illustration 2**. Many of these have since been demolished (**Table 2**). The current plant layout is shown on Figure 3, Site Map, in Appendix A.

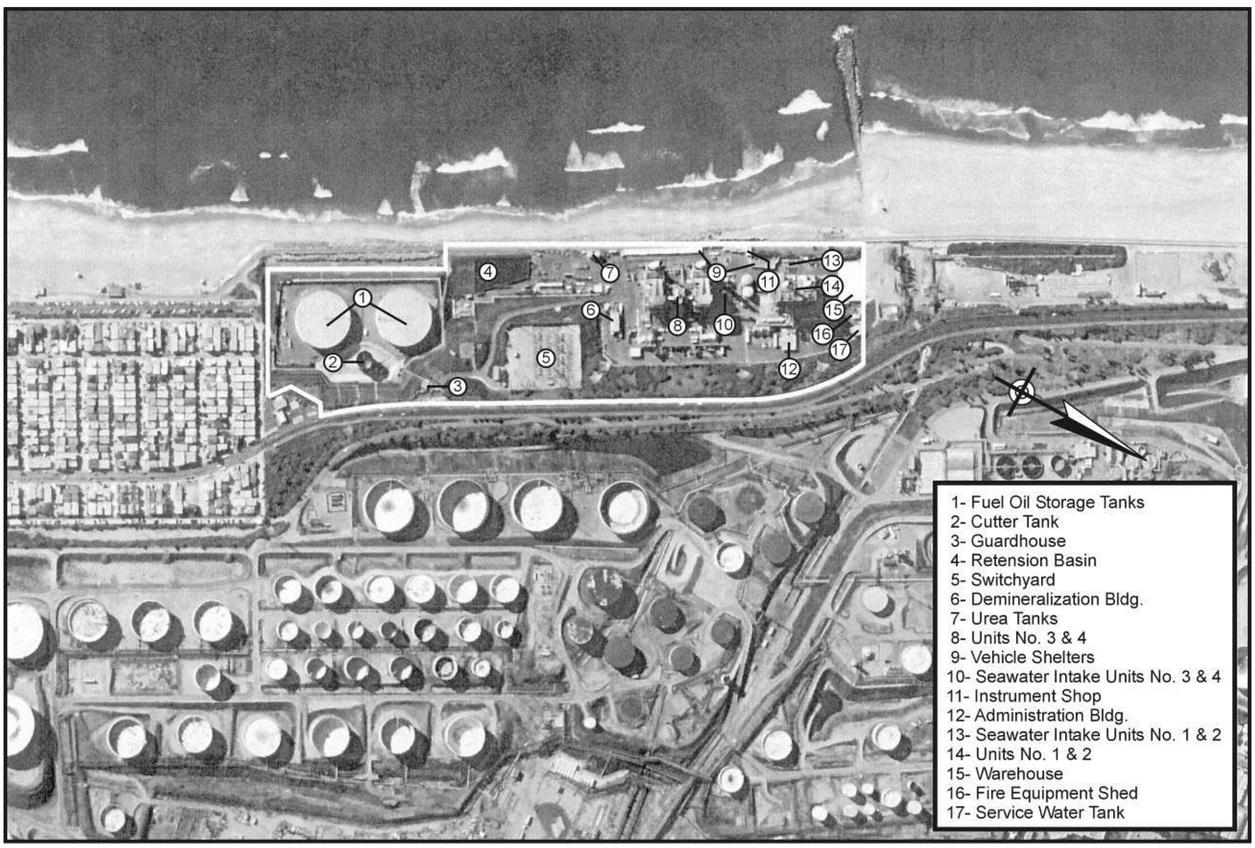

Illustration 2. Aerial image from 2000 showing power station.

[30] NPS, "Guidelines for Evaluating and Nominating Properties that Have Achieved Significance Within the Past Fifty Years," *National Register Bulletin No. 22* (Washington, D.C.: GPO, revised 1996); JRP Historical Consulting Services, "Historic Evaluation of the El Segundo Generating Station, El Segundo, Los Angeles County, California," October 2000.

Table 2		
Buildings and Structures Recorded in 2000 Survey		
Building/Structure	Date of Construction	Currently Extant
Units 1 & 2	1955-1956	No
Seawater Intake for 1 & 2	1955-1956	No
Units 3 & 4	1964-1965	Yes
Seawater Intake for 3 & 4	1964-1965	Yes
Fuel Storage Tanks	ca. 1955	No
Cutter Tank	ca. 1955	Yes
Switching Yard[31]	ca. 1955	Yes
Administration Building	1955	No
Warehouse	1955	No
Instrument Shop	ca. 1965	No
Guardhouse	ca. 1955	Yes
Retention Basins	ca. 1955	Yes
Demineralization Building	unknown	No
Urea Tanks	unknown	No
Vehicle Shelters	unknown	No
Fire Equipment Shed	ca. 1955	No
Service Water Tank	ca. 1955	No

In addition to JRP's 2000 evaluation of the El Segundo plant, several other steam power plants in California of similar size and design and built around the same time as El Segundo have been evaluated under regular NRHP/CRHR Criteria and found to be not eligible. These include Etiwanda (Rancho Cucamonga), Highgrove (Grand Terrace), and South Bay (San Diego). The PG&E Humboldt Bay power plant was found eligible for the National Register, but only the plant's Unit 3 — the nuclear unit — was determined eligible. The study did not evaluate the property as a whole or Units 1 and 2 (the two gas/oil-fired units at the facility) individually for significance.[32]

5.3. Evaluation

The current survey and evaluation of the El Segundo Energy Center finds that it does not meet the criteria for listing in the NRHP or the CRHR, and is not an historical resource for the purposes of CEQA. All buildings or structures in the study area 50 years old and older received evaluation. While Units No. 3 and 4 and their associated buildings and structures were built in

[31] The switching yard is not part of the current property. When SCE sold the plant, they retained possession of the switching yard.
[32] PAR Environmental Services, Inc., "Cultural Resources Study for the PG&E Humboldt Bay Power Plant, ISFSI Licensing Project," August 2003; Will Shapiro, Pacific Legacy, Inc., "Application for Certification for the Humboldt Bay Repowering Project, 2006," DPR 523 Form, PG&E Humboldt Bay Power Plant, April 10, 2006.

1964 and 1965, respectively, they are sufficiently close enough to be evaluated as properties 50 years old or older. In addition to not meeting the significance criteria this facility also lacks integrity. None of the more recently constructed buildings less than 50 years old appear to merit evaluation under Criteria Consideration G for exceptional importance. Therefore, none of the buildings in the project area appear to be significant historic properties under Section 106, nor do they appear to be historical resources for the purposes of CEQA.

In the 2000 evaluation JRP concluded that the El Segundo Generating Station failed to meet the criteria for exceptional importance as a resource less than 50 years old for the above stated reasons. The ESEC has now reached the 50 year old threshold and will be evaluated using the standard NRHP/CRHR Criteria for such properties. While the property no longer needs to meet the threshold of "exceptional importance" it still does not meet the criteria for listing in the NRHP or the CRHR for the same reasons it did not in 2000. The property is not significant within the context of the development of electric power generation, steam power plants, or the history of SCE (Criterion A/1). At the time of its construction, the plant was one of many being built of similar – often nearly identical – design by SCE after World War II to supply the growing post-war demand for electricity is southern California. In addition to SCE, other companies throughout California including PG&E, California Electric and San Diego Gas and Electric were also building similar plants at this time to meet the need. Among those built by SCE were Redondo Beach (1952), Etiwanda (1953), Alamito (1956), Huntington Beach (1958) and Mandalay (1958). These plants and associated substations generated the power needed by SCE to answer the demands of its customers. While ESEC was obviously important to its customers, it was one of many such power plants built during this era of growth that served essentially the same function and this single plant does not stand out as particularly important within the SCE system or electrical generating development in California.

Under Criterion C/3, the El Segundo Energy Center is not significant for its design or construction. This facility, including Units 3 and 4, was constructed as an outdoor, oil-fired steam generating power plant, a design that was standard and common for the period. In addition, all of the equipment installed at the plant was also typical for this type of facility. Nothing about the design or construction of the El Segundo station was unique, or required groundbreaking or innovative features to surmount engineering or design challenges.

The El Segundo Energy Center does not appear to be importantly associated with the life of a historically significant person (Criterion B/2). Finally, this property is well-documented in company records and construction documents and does not appear to be a potential source of information important to history (Criterion D/4).

In addition to lacking historical significance and not meeting the above criteria, the plant has undergone major demolitions and alterations since 2000 that have severely diminished its integrity. A number of buildings and structures have recently been demolished at the facility including the demineralization building, both of the fuel oil storage tanks, urea tanks, vehicle shelters, administration building, Units No. 1 and 2, seawater intakes for Units No. 1 and 2, and the warehouse.

This property has been evaluated in accordance with Section 106 of the NHPA and Section 15064.5(a) (2)-(3) of the CEQA Guidelines, using the criteria outlines in Section 5024.1 of the California Public Resources Code, and does not appear to be a historical resource for the purposes of CEQA. A comprehensive evaluation of this property is located in the DPR 523 form in Appendix B.

6. PREPARERS' QUALIFICATIONS

JRP Principal Rand F. Herbert (MAT in History, University of California Davis, 1977), provided project direction and management for the preparation of the report, directed the field work, and edited the report and forms. Mr. Herbert has more than 30 years professional experience working as a consulting historian and architectural historian on a wide variety of historical research and cultural resource management projects as a researcher, writer, and project manager. Mr. Herbert qualifies as a historian/architectural historian under United States Secretary of Interior's Professional Standards (as defined in 36 CFR Part 61).

JRP Staff Historian Steven J. Melvin (M.A., Public History, California State University, Sacramento) was the lead historian for this project. Mr. Melvin conducted fieldwork and drafted the updated report and DPR 523 form. Mr. Melvin has more than eight years of professional experience in conducting inventory and evaluation studies, and qualifies as an architectural historian and historian under the Secretary of the Interior's Professional Qualification Standards (as defined in 36 CFR Part 61).

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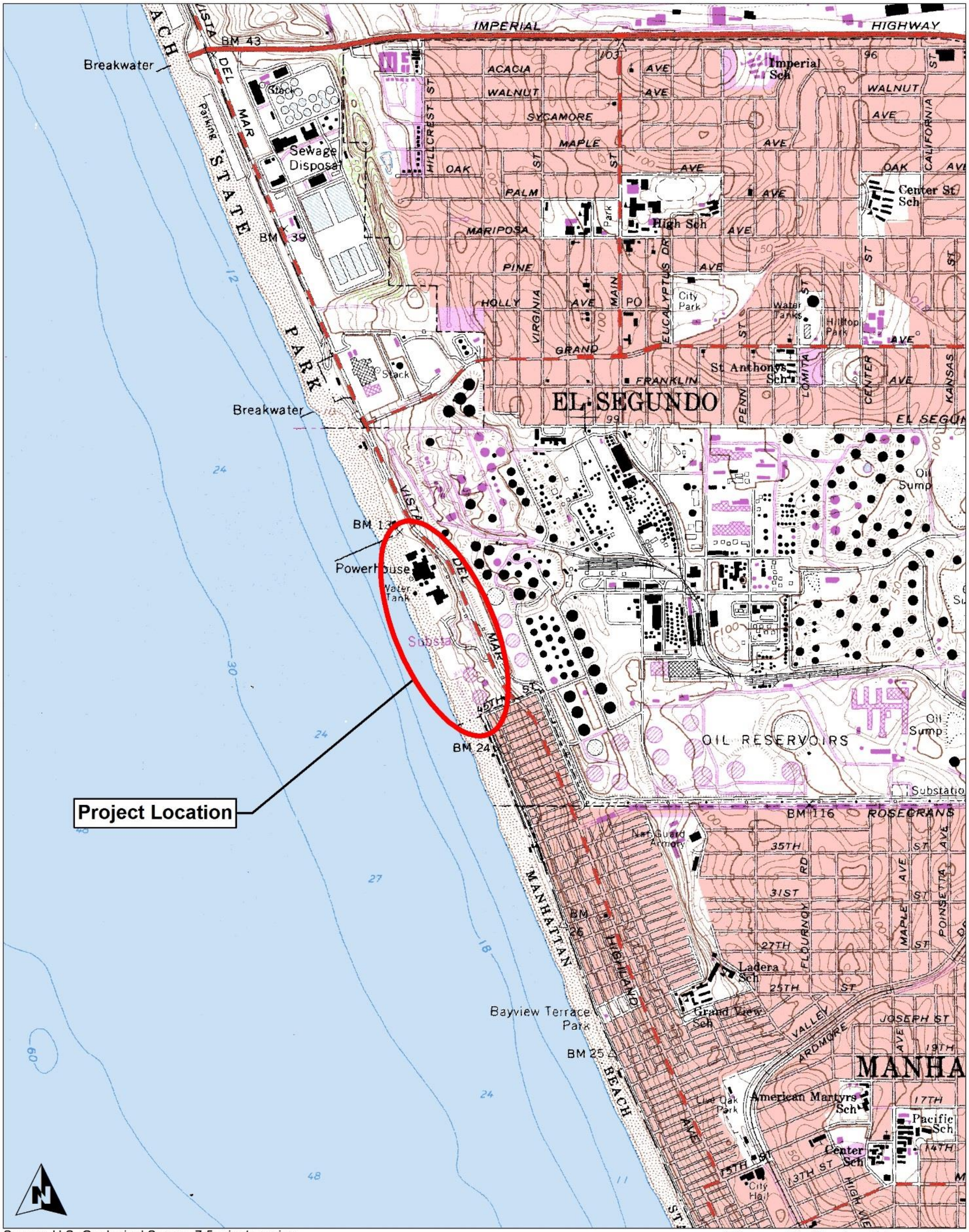
APPENDIX A

Maps

Figure 1. Project Vicinity



Source: U.S. Geological Survey, 7.5 minute series,
Venice, CA (1964, photorevised 1981).

Figure 2. Project Location

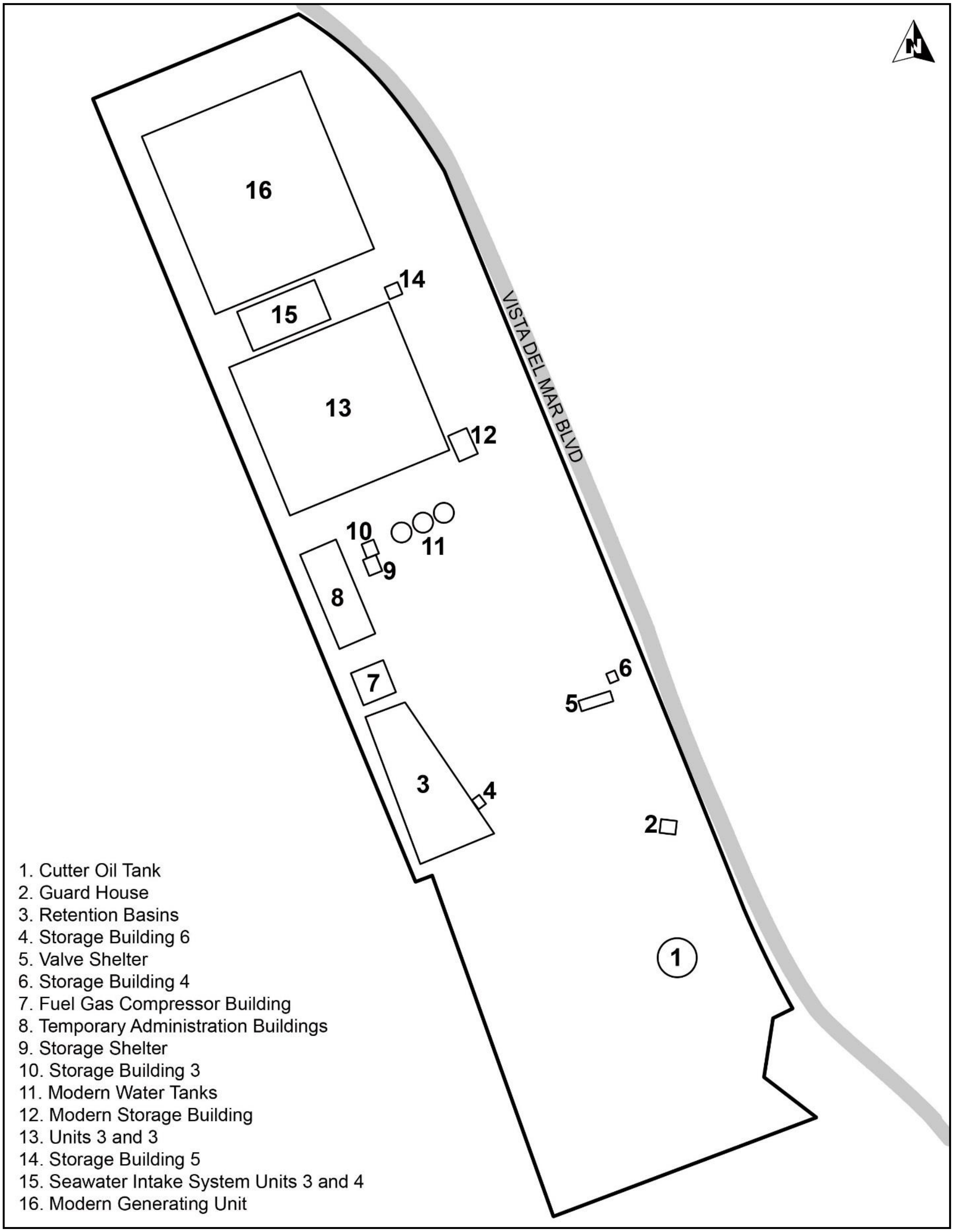


Figure 3. Site Map

APPENDIX B

DPR 523 Form

State of California – The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary # ______
HRI # ______
Trinomial ______
NRHP Status Code 6Z

Other Listings ______
Review Code ______ Reviewer ______ Date ______

 ***Resource Name or #** (Assigned by recorder): El Segundo Energy Center

P1. Other Identifier: El Segundo Generating Station; El Segundo Power Plant

***P2. Location:** ☐ **Not for Publication** ☒ **Unrestricted** ***a. County:** Los Angeles
and (P2b and P2c or P2d. Attach a Location Map as necessary.)

***b. USGS 7.5' Quad:** Venice **Date:** 1964 (photorevised 1981) **T:** 3S; **R:** 15W; **Sec:** ___; S.B.**B.M.**

c. Address: 301 Vista Del Mar Boulevard City: El Segundo Zip: 90245

d. UTM: (give more than one for large and/or linear resources) Zone: ______; ______mE/ ______mN

e. Other Locational Data: (e.g., parcel #, directions to resource, elevation, etc., as appropriate)
AINs: 4138-029-803; 4138-029-800; 4138-029-004

***P3a. Description:** (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)

The El Segundo Energy Center (ESEC) is on a 24.7-acre roughly rectangular parcel bounded on the west by the Pacific Ocean and on the east by Vista Del Mar Boulevard. It is a natural gas fired generating station consisting of two boiler units — Units 3 and 4 — built in 1964 and 1965, respectively, and their associated buildings and structures (**Photograph 1**). Other buildings date to ca. 1955, when the plant was originally built, although the first two units — Units 1 and 2 — have been demolished as have many other ca. 1955 buildings. Also on the property are several buildings and structures built ca. 2013 in association with the construction of a new combined cycle generating unit located north of Units 3 and 4. (See Continuation Sheet)

***P3b. Resource Attributes:** (List attributes and codes) HP9—Public Utility

***P4. Resources Present:** ☒ Building ☒ Structure ☐ Object ☐ Site ☐ District ☐ Element of District ☐ Other (Isolates, etc.)

P5b. Description of Photo: (View, date, accession#) **Photograph 1.** Overview of plant, camera facing north, November 25, 2013.

***P6. Date Constructed/Age and Sources:** ☒ Historic ☐ Prehistoric ☐ Both
1964, 1965 (Southern California Edison)

***P7. Owner and Address:**
El Segundo Energy Center, LLC
5790 Fleet Street, #200
Carlsbad, CA
92008

***P8. Recorded by:** (Name, affiliation, address)
Steven J. Melvin
JRP Historical Consulting, LLC
2850 Spafford Street
Davis, CA 95618

***P9. Date Recorded:** November 25, 2013

***P10. Survey Type:** (Describe)
Intensive

***P11. Report Citation:** (Cite survey report and other sources, or enter "none.") JRP Historical Consulting, LLC, "Historical Resources Inventory and Evaluation Update Report, El Segundo Energy Center, El Segundo Energy Center Petition to Amend (00-AFC-14C), El Segundo, CA," December 2013.

***Attachments:** ☐ None ☐ Location Map ☒ Site Map ☒ Continuation Sheet ☒ Building, Structure, and Object Record ☐ Archaeological Record ☐ District Record ☐ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record ☐ Artifact Record ☐ Photograph Record ☐Other (list) ______

BUILDING, STRUCTURE, AND OBJECT RECORD

***NRHP Status Code** 6Z

***Resource Name or #** (Assigned by recorder): El Segundo Energy Center

B1. Historic Name: El Segundo Steam Station; El Segundo Generating Station

B2. Common Name: El Segundo Energy Center; El Segundo Power Plant

B3. Original Use: electrical power generation B4. Present Use: electrical power generation

***B5. Architectural Style:** utilitarian

***B6. Construction History:** (Construction date, alteration, and date of alterations) Original Units 1 and 2 built 1955; Units 3 and 4 added in 1964 and 1965; demolition of Units 1 and 2, demineralization building, fuel oil storage tanks, urea tanks, vehicle shelters, administration building, fire equipment shed, service water tank, instrument shop, seawater intakes for Units No. 1 and 2, and the warehouse and associated structures ca. 2011; construction of new gas fired combined cycle unit and associated buildings

***B7. Moved?** ☒ **No** ☐ **Yes** ☐ **Unknown** **Date:** ________ **Original Location:** ________

***B8. Related Features:** ________

B9. Architect: Bechtel Corporation b. Builder: Bechtel Corporation

***B10. Significance: Theme:** n/a **Area:** n/a

Period of Significance: n/a **Property Type:** n/a **Applicable Criteria:** n/a

(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.)

The El Segundo Energy Center does not meet the criteria for listing in the National Register of Historic Places (NRHP) or the California Register of Historical Resources (CRHR), nor does it appear to be an historical resource for the purposes of CEQA. This property has been evaluated in accordance with Section 15064.5(a)(2)-(3) of the CEQA Guidelines, using the criteria outlined in Section 5024.1 of the California Public Resources Code.

(See Continuation Sheet.)

B11. Additional Resource Attributes: (List attributes and codes) ________

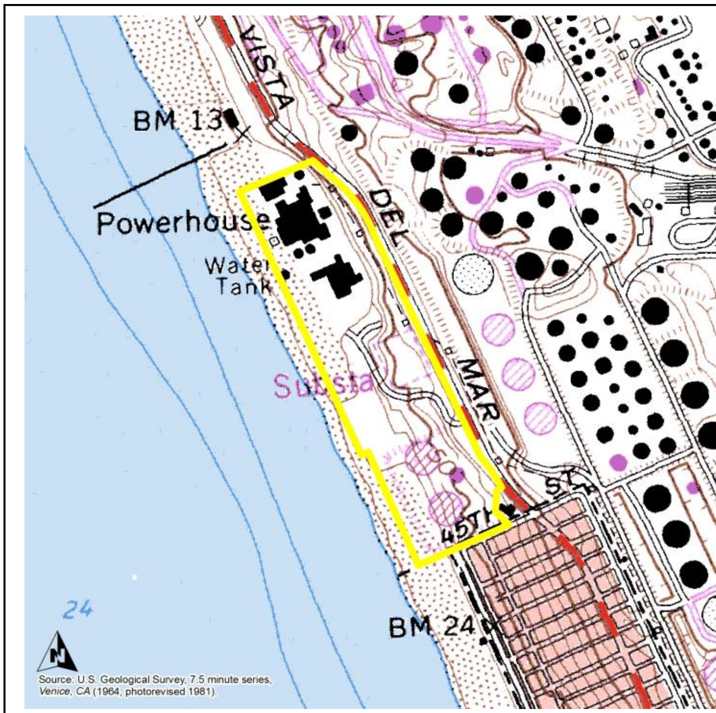
***B12. References:** Meyers, *Iron Men and Copper Wires*; Williams, *Energy and the Making of Modern California*; Steele, "Steam Power Gains on Hydro in California,"; Dickey, "The Design of Two Steam Electric Plants,"; Southern California Edison Annual Reports. See also footnotes.

B13. Remarks:

***B14. Evaluator:** Steven J. Melvin

***Date of Evaluation:** December 2013

(This space reserved for official comments.)



P3a. Description (continued):

Units 3 and 4

Major components of a "unit" are the boiler, turbine generator, boiler stacks, fuel lines, cooling equipment, and other functional elements. Units 3 and 4 are "semi-outdoor" facilities, i.e. much of the equipment is not sheltered within a building but is supported by open steel framework (**Photographs 2** and **3**). The framework structure that supports the boiler units is about 150 feet high and the boiler stacks are about 200 feet tall. A single-story concrete block building is integrated into Units 3 and 4 behind the boiler framework (**Photographs 4**). This element of Units 3 and 4 has metal personnel doors, metal roll-up doors, and louvered vents at the top of the walls. Exterior steel staircases on three sides of this building provide access to the second story operating deck. The turbine generators are located east of the boiler units (**Photograph 5**). Above the generators, and providing access to them, is the operating deck (**Photograph 6**). On the operating deck is a large gantry crane, which can be used for maintenance of either unit (**Photograph 7**). The rails for the crane are on two longitudinal beams on the operating deck which run north/south and extend out past the plane of the wall to permit the crane to hoist material and equipment between the operating deck and ground level. Between the two boilers is two-story concrete block element that houses the control room (**Photograph 8**). At the east end of these units are electrical transformers which send the power to the nearby switching yard.

Saltwater Intake for Units 3 and 4

This structure was built at the same time as Units 3 and 4. It consists of an area set about 20 feet below grade with a concrete floor and concrete walls (**Photographs 9** and **10**). This area has multiple levels joined by concrete stairs and contains various equipment including water pumps, pipes, valves, water screens and a trash rake. At ground level west of the below grade element is a large water tank, pipes and valves. The control room for the seawater intake is on the north side of the structure. It is a small concrete block building with a shed roof. Two metal personnel doors are on the south side.

Guard House

The guard house, built ca. 1955, is at the main entrance to the plant on Del Mar Vista Boulevard (**Photographs 11**). This building is made of concrete blocks with a flat roof with wide eaves. On the façade is a row of large, fixed-pane windows and decorative concrete blocks at one corner. A single metal personnel door is on the east side and two horizontal sliding windows are on the south side.

Other buildings and structures

Four small storage buildings, built ca. 1955, are located throughout the property. These are of nearly identical design, constructed of concrete block with slightly sloping shed roof. Three of these have a metal tilt-up door, while the fourth has a single metal personnel door (**Photographs 12, 13, 14** and **15**).

The cutter oil tank, built ca. 1955, is at the southern part of the parcel (**Photograph 16**). It is a large metal tank with a metal stairway attached to the side. Adjacent to the tank is an excess gas flare. Just north of this tank is the water retention basin also built about 1955 (**Photograph 17**). It is a large, open basin with sides made of built-up berms covered in asphalt. The structure is divided into two sections with the north section being the larger, primary basin. The basins are lined with a waterproof fabric.

Elsewhere on the property are two open-sided shelters. One has steel framework and a corrugated metal shed roof (**Photograph 18**). It is surrounded by a chain-link fence. The other shelter houses valves for ammonium hydroxide (**Photograph 19**). It also has a steel frame with attached corrugated fiberglass sheets covering three sides and the shed roof.
In addition to the above historic-era resources on the property, there are many modern buildings and structures as well. These include the new power generating unit (**Photograph 20**), water tanks (**Photograph 21**), storage building (**Photograph 22**), fuel gas compressor building, and numerous temporary modular units (**Photograph 23**).

B10. Significance (continued):

Historic Context

The El Segundo Energy Center is located along the Pacific Ocean in the city of El Segundo. It was built by the Southern California Edison Company (SCE) in the 1950s and 1960s, with two units coming on-line in 1955 and 1956 (demolished) and another two in 1964 and 1965. This section presents a historic background to provide a basis for evaluating facility for historic significance within the context of the history of SCE, and the oil and gas-fired steam electric generation in California. The section also includes a brief summary of the history of the El Segundo station.

Early California Electrical Generation

Electrical generation in California faced two major problems, securing inexpensive motive force for the generators and transmitting the power to often distant users. California's first electric light glowed in September 1879, when the California Electric Light Company of San Francisco installed a Brush arc light system powered by a steam engine for street lighting. It was costly to run because fuel for its steam engine was expensive. Another source of motive force, hydropower, was available in the Sierra Nevada and had been developed by miners. In fact in 1879, the same year the California Electric Light Company of San Francisco began operations, the Excelsior Water and Mining Company installed its own Brush lighting system. The water driven wheels were inexpensive to operate, but the plant was located far from population centers, and a method for transmitting electric power over long distances had not yet been developed. As a result, the company only produced electricity for its own use.

Even with the twin problems of motive force and transmission, southern California soon began experimenting with electric lighting. George Chaffey was the first to generate electricity in southern California in December of 1882. He purchased a small direct current generator and installed an arc light outside the Garcia ranch, where he and his brother had organized the Etiwanda Colony.[1] The canal did not provide much power, and he could not transmit the power very far. At about the same time, commercial generation began in Southern California. The Los Angeles Electric Company installed Brush street lamps in Los Angeles. Using steam power they could light the city, but again it was expensive because coal and hardwood for the boilers had to be transported long distances to the plant.

Several smaller communities followed after and faced the same problems. Visalia and Santa Barbara installed steam powered systems, but these also proved expensive. Visalia's first plant was forced to close when customers objected to the high prices and unsuitable light. The little hydroelectric plant at Highgrove, on the other hand, was located close enough to provide street lighting to Riverside. It used a low head hydropower site that was able to power 15 arc lamps. Hydropower plants located near users were rare.

The transmission problem was a result of the nature of direct current. Resistance in the wires diminished the amount of electricity received at the user's end, and reduced the distance electricity could be transmitted. Higher voltages reduced the resistance, but were not useful to customers. Alternating current systems, developed by Nicola Tesla and William Stanley and sold by Westinghouse, simultaneously solved the transmission and generation problems. Alternating current systems could be "stepped up" to higher voltages for transmission and back down to useable voltages for distribution by transformers, making it possible to transmit electricity over longer distances. With longer transmission distances, companies could begin to build hydropower plants at a distance from the markets they served.

At first, companies simply used alternating current to enlarge their market area and to provide new services. In the 1890s four early systems, Santa Barbara, Highgrove, Visalia and Pasadena, changed from direct current to alternating current

[1] Donald L. Clucas, *Light Over the Mountain: A History of the Rancho Cucamonga Area* (Upland, California: California Family House Publishers, 1979) 214.

without changing their generation sources. The first model for future generation was the San Antonio Light and Power Company. In 1891 Dr. Cyrus Grandison Baldwin had located an excellent hydropower site 14 miles from Pomona at the San Antonio Canyon. Baldwin hired Almarian William Decker engineer the hydroelectric plant, and formed San Antonio Light and Power Company to develop the site. Decker successfully designed a single-phase alternating current system that began operations in 1892. It was able to provide 120 kW of power, compared to Highgrove's 75 kW.[2] Decker immediately began work on another power plant at Mill Creek which introduced the three phase alternating current to California. This plant produced even more power, 250 kW.[3] These hydroelectric projects proved that power could be transmitted longer distances and increased available power. They also proved to be the most economical means of generation at the time.

Twentieth Century Power Generation in California

Throughout the early twentieth century, however, companies began to reduce their dependence on steam power as they built larger hydroelectric plants, and hydroelectricity dominated electrical generation. In 1920, hydroelectric power accounted for 69 percent of all electrical power generated in California. In 1930, that figure had risen to 76 percent; it rose again to 89 percent in 1940. By this time, however, essentially all of the practical sites for hydroelectric generation had been developed. After World War II, companies began constructing steam plants and the prominence of hydroelectricity began to wane. By 1950, hydroelectricity accounted for 59 percent of the total, a figure that fell to only 27 percent in 1960. Some new hydroelectric plants were built during the 1960s, chiefly associated with federal and state water projects, but by 1970, hydroelectric generation still accounted for only 31 percent of all electricity generated in California.[4]

The statewide trend from hydroelectric to steam powered is reflected in the activities of such companies as Southern California Edison (SCE) and Pacific Gas and Electric Company (PG&E). At the start of World War II, SCE had only one steam powered facility, its plant at Long Beach on Terminal Island. It was, however, a massive operation, with eleven units on-line. These units had been constructed in stages, beginning in 1911. The first three units, completed by 1917, originally burned a heavy fuel oil. These units performed yeoman duty during the drought of the 1930s. New units were added throughout the 1920s and 1930s; nine units were in place by the mid-1930s.[5]

SCE made massive new investments in steam power in the two decades after World War II, as electrical supplies fell far short of demand. The company was not alone in this regard. PG&E made similar investments in steam plants throughout Northern California because it too had exhausted the supply of usable hydroelectric sites.[6] These two companies built most of new steam generation plants in California, although smaller entities such as Los Angeles Department of Water and Power (LADWP), California Electric Power Company, and San Diego Gas and Electric (SDG&E) built plants as well. The facilities relied upon proven technologies, and were assembled quickly and inexpensively, relative to earlier plants. In a detailed article in 1950 in *Civil Engineering*, I.C. Steele, Chief Engineer for PG&E, summarized the design criteria that went into construction of four major steam plants the company had under construction at that time, at Moss Landing, San Francisco, and in Contra Costa County and Kern County. These plants had much in common with each other, he argued, and with other steam plants under construction in the state. The design criteria were the same in all cases: build the facility close to load centers to reduce transmission costs; be close to fuel supplies; be near a water supply; and be on a site where land was cheap and could support a good foundation. In another article in *Transactions of the ASCE*, Walter Dickey, an engineer from Bechtel, detailed the reasons for the boom in steam plant building postponements caused by World War II, lack of economical hydroelectric sites, and needed support of peak load periods. He compared steam generation plant with

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[2] William A. Meyers, *Iron Men and Copper Wires: A Centennial History of the Southern California Edison Company* (Glendale, California: Trans-Anglo Books, 1983) 25.
[3] Meyers, *Iron Men and Copper Wires, 27.*
[4] James C. Williams, *Energy and the Making of Modern California* (Akron, Ohio: University of Akron Press, 1997), 374.
[5] Myers, *Iron Men and Copper Wires*, 49.
[6] Williams, *Energy and the Making of Modern California*, 257.

hydroelectric plants and found steam favorable. Virtually all of the plants in the 1950s and 1960s were designed to be expanded if market conditions warranted -- and most of them were.[7]

The decades between 1950 and 1970 were the period of peak expansion of steam generating capacity for both SCE and PG&E, as well as for smaller utility companies. During this period, SCE built a series of very similar steam plants in the Los Angeles Basin and in San Bernardino County. In 1952, the company began work on Redondo No. 2, which was adjacent to an earlier plant at Redondo Beach. In 1953, the Etiwanda plant went online, followed in 1955 by El Segundo, Alamitos in 1956, and Huntington Beach and Mandalay in 1958. By 1960, all SCE plants either had multiple units or had additional units in the planning stages. In 1950 PG&E operated 15 steam electric plants in California, and during the following decade added several new plants and expanded older ones. Chief among these were the Kern plant (1948-50), Contra Costa (1951-53), Moss Landing (1950-52), Morro Bay (1955), Hunters Point (addition 1958), Humboldt Bay (1956-58), and Pittsburg (1959-60). The Pittsburg plant was at the time of its construction the largest steam station in the west, with a capacity of over 1,300,000 kW in 1960. The LADWP system was much smaller than those of SCE and PG&E, consisting of five steam plants by 1962. In addition to its Seal Beach Plant (1925-28), and Harbor Plant on Los Angeles Harbor (1943) these included the Valley Plant (San Fernando Valley, 1954), Scattergood (1958), and Haynes (1961). SDG&E had three steam-electric power plants, Silver Gate (1943), Encina (1954), and South Bay (1960). By the late 1970s, there were more than 20 fossil fuel thermal plants in California, clustered around San Francisco Bay, Santa Monica Bay, and in San Diego County, along with a few interior plants in San Bernardino County and Riverside and Imperial Counties, as well as a few plants on the Central Coast.[8]

History of the Southern California Edison Company

SCE began in 1896 as the West Side Lighting Company in Los Angeles, California. The company was one of several attempting to enter the Los Angeles market. It could not freely run wires without a city franchise, so the company built its steam plant outside the city limits and ran its lines into the city using poles on private property. Walter S. Wright, one of the founders, located and purchased a franchise, but the terms required the company to light city hall by April 5, 1896. The company rushed to meet the terms, and won the franchise to begin freely supplying electricity in the city.

City ordinances provided another challenge to the company. All the new technology, telephones, electric railroads, fire call boxes and more, had created a tangle of wires along the street. All new wires were required to be placed underground. West Side Lighting determined that the Edison three-wire system would provide the best underground system. Unfortunately, the Los Angeles Edison Electric Company held the rights to use the system in Los Angeles but had not developed any facilities. In 1897 West Side Lighting purchased the Los Angeles Edison Electric and became Edison Electric Company of Los Angles. Using the new three-wire system to install underground conduit downtown, the company gained new customers. In 1898 the company built a second steam-powered plant in Los Angeles to keep up with demand.

The company grew throughout the early twentieth century to emerge as the dominant utility in Southern California, achieving a presence in the southland that approximated that of the Pacific Gas & Electric Company in Northern California. Like the PG&E, SCE grew chiefly through acquisition, buying or merging with numerous pioneering electrical and gas companies in the region. Although several dozen small companies were folded into this utility, the principal assets came

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[7] I.C. Steele, "Steam Power Gains on Hydro in California," *Civil Engineering* (January 1950): 17-21; Edgar J. Garbarini, "Design Saves Construction Dollars on Contra Costa Power Plant," *Civil Engineering* (May 1953): 31-33; Walter L. Dickey, "The Design of Two Steam Electric Plants," *ASCE Transactions* (1956): 253-273.
[8] Annual Reports of the Southern California Edison Company, various years. R.W. Spencer, "Cooling Water For Steam Electric Stations in Tidewater," *Transactions of the American Society of Civil Engineers* 126 (1961): 280-302; I. C. Steele, "Steam Power Gains on Hydro in California," 17-19; Dickey, "The Design of Two Steam Electric Plants," 253-255; *Southwest Builder and Contractor*, "Haynes Steam Plant Will Grow With Demand," *Southwest Builder and Contractor* (October 12, 1962): 24-27; Williams, *Energy and the Making of Modern California*, 257.

from three firms: Southern California Edison Co., which was organized in 1909; the Pacific Light & Power Company, organized in 1902 and which rivaled Southern California Edison when the two companies merged in 1917; and the California Electric Power Company (often called Calelectric), which combined a number of small companies in 1941 and was merged into SCE in 1964.[9]

Throughout its history, SCE and its predecessor companies have been known for technological innovation. These dozens of predecessor companies were responsible for numerous groundbreaking developments in the larger field of electric power generation. The earliest plants by predecessor companies were the previously-mentioned small steam plants in Visalia and Santa Barbara, both constructed in the mid-1880s. Within just a few years, however, various predecessor companies began building hydroelectric plants and for half a century, the SCE and its predecessors were most closely associated with innovations in hydroelectric power generation. The San Antonio Light and Power Company, for example, is widely credited with developing the first "step-up, step-down" transformers to transmit power from its plant in San Antonio Canyon. This company merged into the Pacific Light & Power Company before it was acquired by SCE. The Mill Creek plant near Redlands is regarded as the origin of three-phase alternating current transmission, creating an industry standard.[10] The Southern California Edison Company built numerous record-breaking high-head hydroelectric power facilities, including two on the Kern River during the 1910s and 1920s.[11] The Pacific Light & Power Company gained international attention in the 1910s when it built its massive Big Creek Project, one of the most impressive hydroelectric power generation facilities in American history.[12] SCE continued to expand its Big Creek system through 1929. It became the largest producer for the company, making SCE highly dependent on hydroelectric power by the 1920s. It was SCE's cheapest source and allowed the company to continuously reduce rates.

Given this massive investment in hydroelectric plants, SCE and Calelectric relied principally upon hydroelectric power to satisfy the demands of its customers, at least as long as it was possible to do so. William Myers, the principal historian of SCE, noted that "until World War Two, both Edison and Calelectric were predominantly hydro companies, with steam essentially used in standby service to meet peak demands or emergency situations."[13]

Hydroelectricity, however, had its limitations. Abnormally low snowfall in the mountains in 1920-1924 dramatically reduced the amount of water available to produce electricity. SCE encouraged customers to conserve, reduced electric rail routes, and brought back into service old steam powered generators, all in an attempt to maintain electrical service levels. The most successful effort was interconnecting several of the utilities. This allowed companies with surplus power to sell it to neighboring companies. After this drought, SCE and other companies that relied heavily on hydropower altered their strategy. While they continued to rely on cheap hydroelectric power, they insured they had sufficient back up sources of power to meet growing demand.

SCE had grown continuously since its inception, but during the Depression growth slowed and the company cut costs by shrinking its workforce through attrition and changing to a five-day workweek. SCE improved efficiency at existing plants and streamlined its finances, using lower interest rates to reduce outstanding bonds from its long period of growth and expansion. Reduced energy use and new plants that came online just before the Depression gave SCE an electricity surplus. As a result, the company reduced rates and encouraged increased electrical use. Company employees toured SCE's service

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9 These numerous predecessor companies are shown in a chart in: William A. Myers, *Iron Men and Copper Wires: A Centennial History of the Southern California Edison Company* (Glendale, CA: Trans-Anglo Books, 1983).
10 These pioneering plants are discussed in all major histories of the hydroelectric industry. See, for example, Norman A. F. Smith, *Man and Water: A History of Hydro-Technology* (New York: Scribner's, 1976).
11 Stephen D. Mikesell, "Historic Resource Evaluation Report, Kern River No. 1 Power House," prepared for the California Department of Transportation, August, 1988; Stephen D. Mikesell, "Kern River No. 3 System," National Register of Historic Places Registration Form, July 28, 1989, prepared for Entrix, Inc., and the Southern California Edison Company.
12 Numerous histories exist for the Big Creek project, including: David H. Redinger, *The Story of Big Creek* (Los Angeles: Angelus Press, 1952).
13 Myers, *Iron Men and Copper Wires*, 208.

areas demonstrating new electrical appliances in an effort to increase power use. Increased consumer demand for these appliances also led to higher demand by manufacturers of those products. SCE's program worked, and when the company received electricity from Hoover Dam in 1939 it had a ready market to buy the power.

World War II further increased the demand for electricity as manufacturers moved to the area to meet war needs. This transformation was especially notable in the Los Angeles Basin, where aircraft manufacturers and other war-related industries induced a dramatic growth in the population and economy of the region. This trend did not subside with the end of the war. Indeed, the population of the basin grew even faster during the late 1950s than it had during the 1940s. The result was a steady increase in the demand for electricity and SCE became the fastest growing utilities in the nation during the early post-war era.[14]

SCE built and expanded several plants between 1945 and 1970. During this rapid increase in the number of plants, their designs and technologies became fairly standardized. In 1951, SCE broke ground on a plant at Etiwanda, planned initially for two units but with provision for expansion.[15] In 1952, it began work on Redondo No. 2, which was adjacent to an earlier plant at Redondo Beach. Etiwanda began operating in 1953 and Redondo No. 2 in 1954. In 1955, the first unit of the El Segundo Generating Station went on-line and construction was initiated for a similar plant at Alamitos in Long Beach. In 1956, the second El Segundo unit was up and running, as was the first unit at Alamitos. The next year, the second unit at Alamitos started generating power, as did a sixth unit at Redondo. New facilities were planned that year for Huntington Beach and Mandalay, in Los Angeles and Ventura counties respectively, which both started operating in 1958. In 1959, the company added additional units at Mandalay. Expansion continued with SCE installing new units at Huntington Beach and Alamitos in 1960 and planning new units for the Etiwanda facility. This trend persisted over the next years as SCE installed new units at Huntington Beach and Alamitos, while new facilities were planned for Alamitos, Etiwanda, and El Segundo. The company put a third unit at El Segundo on-line in 1964 and fired up its fourth unit in 1965. The following year, new units were ordered for Mandalay, Alamitos, Huntington Beach, and Etiwanda.

Not surprisingly, these new units were very similar to each other in design. SCE invested hundreds of millions of dollars in this expansion and benefited from economy of scale by purchasing units that were similar, although not entirely identical. The similarity of these units is most readily apparent from the look of the plants (the general appearance of each unit is remarkably similar) and from their description in SCE annual reports. Their individual capacities, however, differed based upon the equipment installed. It appears that the company exercised its purchasing power by ordering several identical units each year. For example, in 1956, the company initiated construction on four units, one at El Segundo, two at Alamitos, and one at Redondo. The four had identical capacities (165,000 KW each) and nearly identical cost (each about $20 million). In 1958, the company installed four units (two each at Huntington Beach and Mandalay), each with an identical capacity of 200,000 KW. In 1961, the company ordered four units (one for Alamitos, two for Etiwanda, and one for El Segundo), each with an identical capacity of 310,000 KW. Similar trends prevailed in other years as well. In addition to ordering identical units each year, the general trend was toward larger and larger units, a fact that is illustrated in the four units that were installed at El Segundo.

In addition to its gas and oil-fired steam plants, SCE also made investments in nuclear power. In 1957, it built a small experimental station, called the Santa Susana Experimental Station, in Ventura County. The success of this pilot plant led the company to build the major nuclear plant at San Onofre, in cooperation with the San Diego Gas and Electric Company, which owned 20 percent. Construction began in 1963 and the plant went on-line in 1967.[16]

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[14] William A. Myers, *Iron Men and Copper Wires,* 200; Big Creek was expanded in the late 1940s and early 1950s, spending about $21 million to increase the capacity by 84 MW. W. L. Chadwick, "Load Capacity of Southern California Edison Company to 2 ¾ Billion Kwhr per Year," *Civil Engineering* 20 (May 1950): 314-315.
[15] These conclusions are from the Annual Reports of the Southern California Edison Company, various years as noted in the text; JRP Historical Consulting, "Historic Resources Inventory and Evaluation Report for the proposed Etiwanda Expansion Project." 2007.
[16] Myers, *Iron Men and Copper Wires*, 212.

Deregulation of the electricity industry in the 1980s changed how power was generated and distributed and often led to separation of the two processes. SCE responded to deregulation by selling off most of its steam plants by 1997 including Huntington Beach, Redondo Beach, Barstow, Ventura, Goleta, Etiwanda, Alamitos, San Bernardino, El Segundo, Long Beach, and Oxnard. Today, it operates as a power distributor, covering most of southern California from San Onofre north to Santa Barbara on the Pacific coast, widening to include territory from Blythe in the Mojave Desert to past Bishop on the eastern side of the Sierra Nevada.[17]

History of the El Segundo Energy Center

As briefly described above, the El Segundo Energy Center was built in stages between 1953 and 1965, in the midst of a great expansion of the oil (later gas) fired steam generating capacity of the SCE. Although construction of the plant was started in late 1953, it was first mentioned in the 1954 *Annual Report*. Throughout the 1950s, SCE operated El Segundo as a two-unit station; not until the 1960s did the company plan for an additional two units there. The pertinent entry in the 1954 *Annual Report* reads: "a tidewater steam station consisting of two units, each with an anticipated rating of 160,000 kilowatts, was started at El Segundo in October 1953. The first unit is scheduled for completion in July 1955 and the second in September 1956. As its principal fuel the El Segundo station will use high viscosity fuel oil from an adjacent refinery. The station is expected to cost $45,000,000."[18]

SCE awarded the overall engineering-constructor contract for the El Segundo plant to the Bechtel Corporation of Los Angeles who acted as the field construction organization. Bechtel supervisors oversaw civil, mechanical, and electrical field engineering, as well as providing primary construction workers, although SCE also contracted with many other local firms for various aspects of the work. One of the first subcontractors to work on the project was Silva & Hill Construction Company who relocated Coast Boulevard (later renamed Via Del Mar Boulevard) to create more room for the plant between the beach and the bluffs below the refinery property to the east. Other major subcontractors for the project included Consolidated Western Steel Company (boiler superstructure manufacture and construction), Consolidated Chimney Company (boiler stacks), and C. C. Moore & Company (installation of steam generator). By the time SCE issued its 1955 *Annual Report*, the company stated that "the first unit at El Segundo Steam Station began commercial operation in May 1955, approximately one and one-half years after its construction commenced. The unit, which is the first of two at this location, cost approximately $24,000,000 and has an effective operating capacity of 175,000 kilowatts." Construction of Unit No. 2 dovetailed with this activity when Bechtel started the foundation work on the 165,000 KW unit in December 1954. Meanwhile, SCE was expanding other plants, such as Redondo Beach where the company installing a sixth unit at Redondo Beach.[19]

The 1956 *Annual Report* continued to treat El Segundo as a two-unit facility: "The second and final unit at El Segundo Steam Station began commercial operation in August, 1956."[20] The plant was not mentioned again until 1961. The *Annual Report* of that year noted that: "The Company has four additional steam units under construction or planned …" and listed El Segundo Unit No. 3 as a 310,000 KW facility, planned for completion in September 1964.[21] In 1962, the company announced that it was planning to install two new units (Units 3 and 4) at El Segundo in 1964 and 1965, each with a

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[17] Michael Diamond, "Edison to Sell Three Inland Empire Power Plants," *San Bernardino Daily Sun* (November 23, 1996); "Edison Sells 10 Gas-Fired Plants," *Los Angeles Times* (November 25, 1997): D-2.
[18] Bechtel, "Unit No. 1, Completion Cost Report," 18; Southern California Edison, 1954 *Annual Report*, 13.
[19] Bechtel, "Unit No. 1, Completion Cost Report," 29-31; Bechtel, "Unit No. 2, Completion Cost Report," 15; Southern California Edison, 1955 *Annual Report*, 12.
[20] Southern California Edison, 1956 *Annual Report*, 12.
[21] Southern California Edison, 1961 *Annual Report*, 8.

scheduled capacity of 320,000 KW. The 1963 *Annual Report* noted that the two new units were under construction, each with a scheduled capacity of 325,000 KW. [22]

Bechtel served as the engineer-constructor for the project, as it had for the first two units; likewise, some of the subcontractors chosen for work on Units No. 3 and 4 had also worked on the earlier project. For example, Clyde W. Wood & Sons won the contract for site preparation in May 1962 and soon began excavating and grading, Bechtel performed the dewatering for the seawater intake structure and oversaw the rest of the construction, while Custodis Engineering Company built the boiler stacks. Unit 3 went on-line with the noted capacity in August 1964 and the fourth unit did so in 1965 (**Illustration 1**).[23]

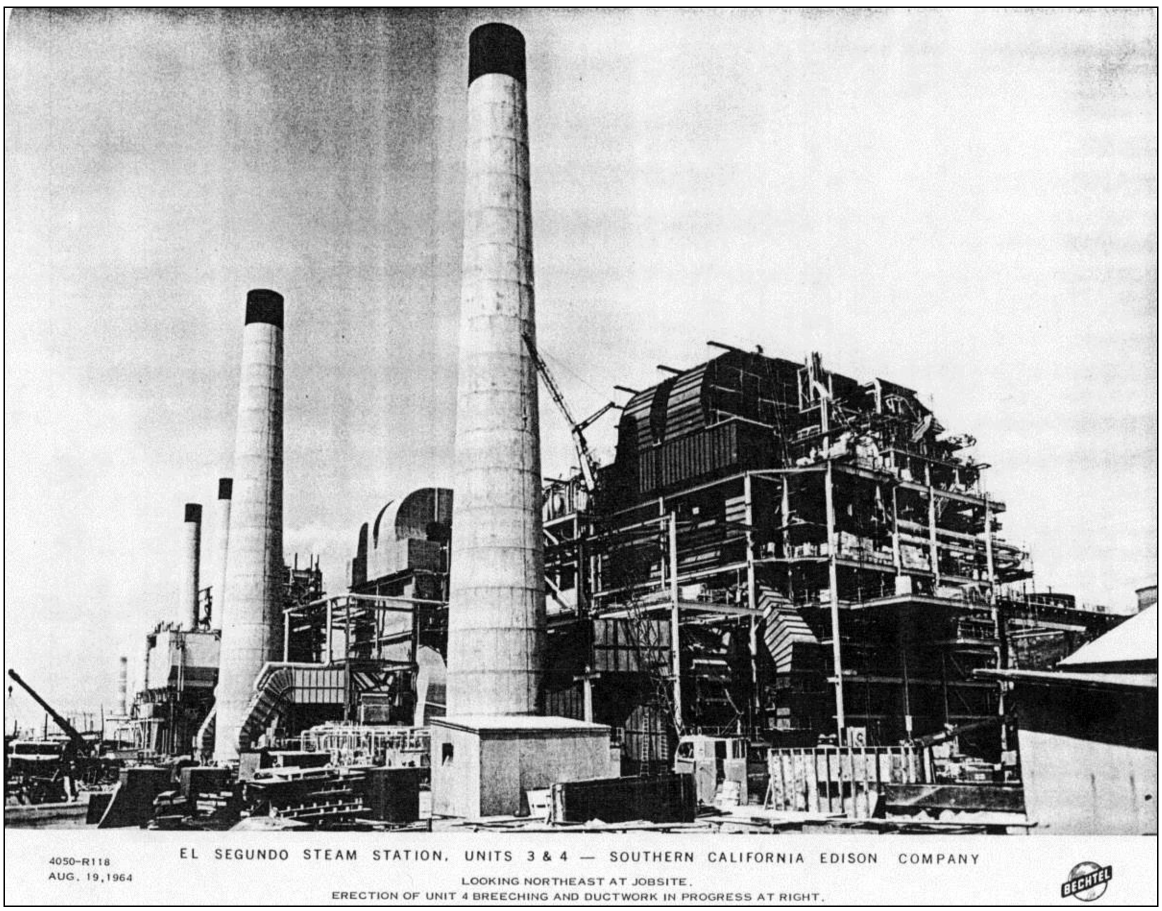

Illustration 1**. El Segundo Units 3 & 4 in 1964.**

The El Segundo facility has been in commercial operation since its first phase of construction in the mid-1950s. The units were all converted to natural gas during the 1970s for purposes of reducing emissions. In 1997, SCE sold the units as part of a larger program of divestiture. The current owners acquired El Segundo Station as part of a massive auction in which all but two of the SCE gas-fired steam plants were sold.[24]

Evaluation

[22] Southern California Edison, 1962 *Annual Report*, 8; Southern California Edison, 1963 *Annual Report*, 8.
[23] "Edison Steam Station Expands," *Southwest Builder & Contractor* (November 8, 1963): 12-15, 32.
[24] "Edison Sells 10 Gas-Fired Plants," *Los Angeles Times* (November 25, 1997): D-2.

JRP previously evaluated the El Segundo Generating Station in 2000 and found it did not meet the criteria for listing in the NRHP or the CRHR, and was not an historical resource for the purposes of CEQA. As a property less than 50 years old at the time, JRP evaluated the station under NRHP Criteria Consideration G, which allows for evaluation of properties less than fifty years old for "exceptional importance." Under NRHP Criterion A/CRHR Criterion 1, JRP concluded that the station did not meet this criterion and was not exceptionally significant. Specifically, the station did not "appear to represent an exceptionally important property within the context of the development of the Southern California Electric Company." Additionally, the station was not "exceptionally significant within the context of steam generation plants in California, whether seen in the long history of the area, or in the more limited context of steam plants during the immediate post-war era." In terms of design (NRHP Criterion C/CRHR Criterion 3), JRP noted the "typical" nature of the El Segundo plant and concluded it did not represent "new departure in the technology of steam generation of electrical power… plant siting, foundation work, or any other aspect of power plant construction techniques.[25] JRP summarized its 2000 evaluation with the following statement:

> …the El Segundo Generating Station does not appear to represent an exceptionally significant property, whether considered within the context of the history of the Southern California Edison Company, the history of steam electrical generation, or the more limited context of steam plants built by SCE during the post-war era. Its dominant characteristic is its typicality rather than its exceptionality.

In addition to JRP's 2000 evaluation of the El Segundo plant, several other steam power plants in California of similar size and design and built around the same time as El Segundo have been evaluated under regular NRHP/CRHR Criteria and found to be not eligible. These include Etiwanda (Rancho Cucamonga), Highgrove (Grand Terrace), and South Bay (San Diego). The PG&E Humboldt Bay power plant was found eligible for the National Register, but only the plant's Unit 3 — the nuclear unit — was determined eligible. The study did not evaluate the property as a whole or Units 1 and 2 (the two gas/oil-fired units at the facility) individually for significance.[26]

The ESEC has now reached the 50 year old threshold and will be evaluated using the standard NRHP/CRHR Criteria for properties 50 years old or older. While Units No. 3 and 4 were built in 1964 and 1965, respectively, they are sufficiently close enough to be evaluated as properties 50 years old or older. Under NRHP Criterion A/CRHR Criterion 1, ESEC does not have important associations with significant historic events, patterns, or trends of development. The power plant is not significant within the context of the development of electric power generation, steam power plants, or the history of SCE. At the time of its construction, the plant was one of many being built of similar – often nearly identical – design by SCE after World War II to supply the growing post war demand for electricity is southern California. In addition to SCE, other companies throughout California including PG&E, California Electric and San Diego Gas and Electric were also building similar plants at this time to meet the need. Among those built by SCE were Redondo Beach (1952), Etiwanda (1953), Alamito (1956), Huntington Beach (1958) and Mandalay (1958). These plants and associated substations generated the power needed by SCE to answer the demands of its customers. While ESEC was obviously important to its customers, it was one of many such power plants built during this era of growth that served essentially the same function and this single plant does not stand out as particularly important within the SCE system or electrical generating development in California.

This property is not significant for an association with the lives of persons important to history (NRHP Criterion B/CRHR Criterion 2). It does not appear that any individual associated with this property has made demonstrably important contributions to history at the local, state, or national level.

Under NRHP Criterion C/CRHR Criterion 3, the El Segundo Energy Center is not significant for its design or construction. This facility was constructed as an outdoor, oil-fired steam generating power plant and gradually converted to gas. This

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[25] NPS, "Guidelines for Evaluating and Nominating Properties that Have Achieved Significance Within the Past Fifty Years," *National Register Bulletin No. 22* (Washington, D.C.: GPO, revised 1996); JRP Historical Consulting Services, "Historic Evaluation of the El Segundo Generating Station, El Segundo, Los Angeles County, California," October 2000.

[26] PAR Environmental Services, Inc., "Cultural Resources Study for the PG&E Humboldt Bay Power Plant, ISFSI Licensing Project," August 2003; Will Shapiro, Pacific Legacy, Inc., "Application for Certification for the Humboldt Bay Repowering Project, 2006," DPR 523 Form, PG&E Humboldt Bay Power Plant, April 10, 2006.

design was standard and common for the period. In addition, all of the equipment installed at the plant was also typical for this type of facility. Nothing about the design or construction of the El Segundo station was unique or required groundbreaking or innovative features to surmount engineering or design challenges.

Finally, this property is well-documented in company records and construction documents and does not appear to be a likely source of important information about historic construction materials or technologies (NRHP Criterion D/CRHR Criterion 4).

In addition to lacking historical significance and not meeting the above criteria, the plant has undergone major demolitions and alterations since 2000 that have severely diminished its integrity. The 2000 survey identified 17 built environment resources. Of these the demineralization building, both fuel oil storage tanks, urea tanks, vehicle shelters, instrument shop, a fire equipment shed, administration building, Units No. 1 and 2, seawater intakes for Units No. 1 and 2, service water tank, fire equipment shed and the warehouse have all been demolished. Also several new buildings and structures have been built including a new power generating unit, water tanks, storage building, and fuel gas compressor building. These alterations have diminished the property's integrity of design, materials, setting and workmanship.

Photographs (continued):

Photograph 2: Unit 3, camera facing southeast, November 25, 2013.

Photograph 3: Unit 4, camera facing northeast, November 25, 2013.

Photographs (continued):

Photograph 4: Unit 4, camera facing northwest, November 25, 2013.

Photograph 5: Unit 4 generator, camera facing north, November 25, 2013.

Photographs (continued):

Photograph 6: Unit 3 generators from operating deck, camera facing north, November 25, 2013.

Photograph 7: Unit 3 with movable overhead crane and generators in foreground, camera facing northwest, November 25, 2013.

Photographs (continued):

Photograph 8: Control room building for Units 3 and 4, camera facing southeast, November 25, 2013.

Photograph 9: Seawater intake system for Units 3 and 4, camera facing northwest, November 25, 2013.

Photographs (continued):

Photograph 10: Seawater intake system for Units 3 and 4, camera facing southwest, November 25, 2013.

Photograph 11: Guardhouse, camera facing southeast, November 25, 2013.

Photographs (continued):

Photograph 12: Storage building 3, camera facing south, November 25, 2013.

Photograph 13: Storage building 4, camera facing northwest, November 25, 2013.

Photographs (continued):

Photograph 14: Storage building 5, camera facing southeast, November 25, 2013.

Photograph 15: Storage building 6, camera facing northwest, November 25, 2013.

Photographs (continued):

Photograph 16: Cutter oil tank and flare, camera facing south, November 25, 2013.

Photograph 17: Retention basins, camera facing northwest, November 25, 2013.

Photographs (continued):

Photograph 18: Storage shelter, camera facing northeast, November 25, 2013.

Photograph 19: Ammonium hydroxide valve shelter, camera facing northeast, November 25, 2013.

***Resource Name or #** (Assigned by recorder): El Segundo Energy Center

***Recorded by:** S. J. Melvin ***Date:** November 25, 2013 ☒ Continuation ☐ Update

Photographs (continued):

Photograph 20: Modern power generating unit north of Units 3 and 4, camera facing north, November 25, 2013.

Photograph 21: Modern water tanks, camera facing southeast, November 25, 2013.

***Recorded by:** S. J. Melvin ***Date:** November 25, 2013 ☒ Continuation ☐ Update

Photographs (continued):

Photograph 22: Modern storage building, camera facing northeast, November 25, 2013.

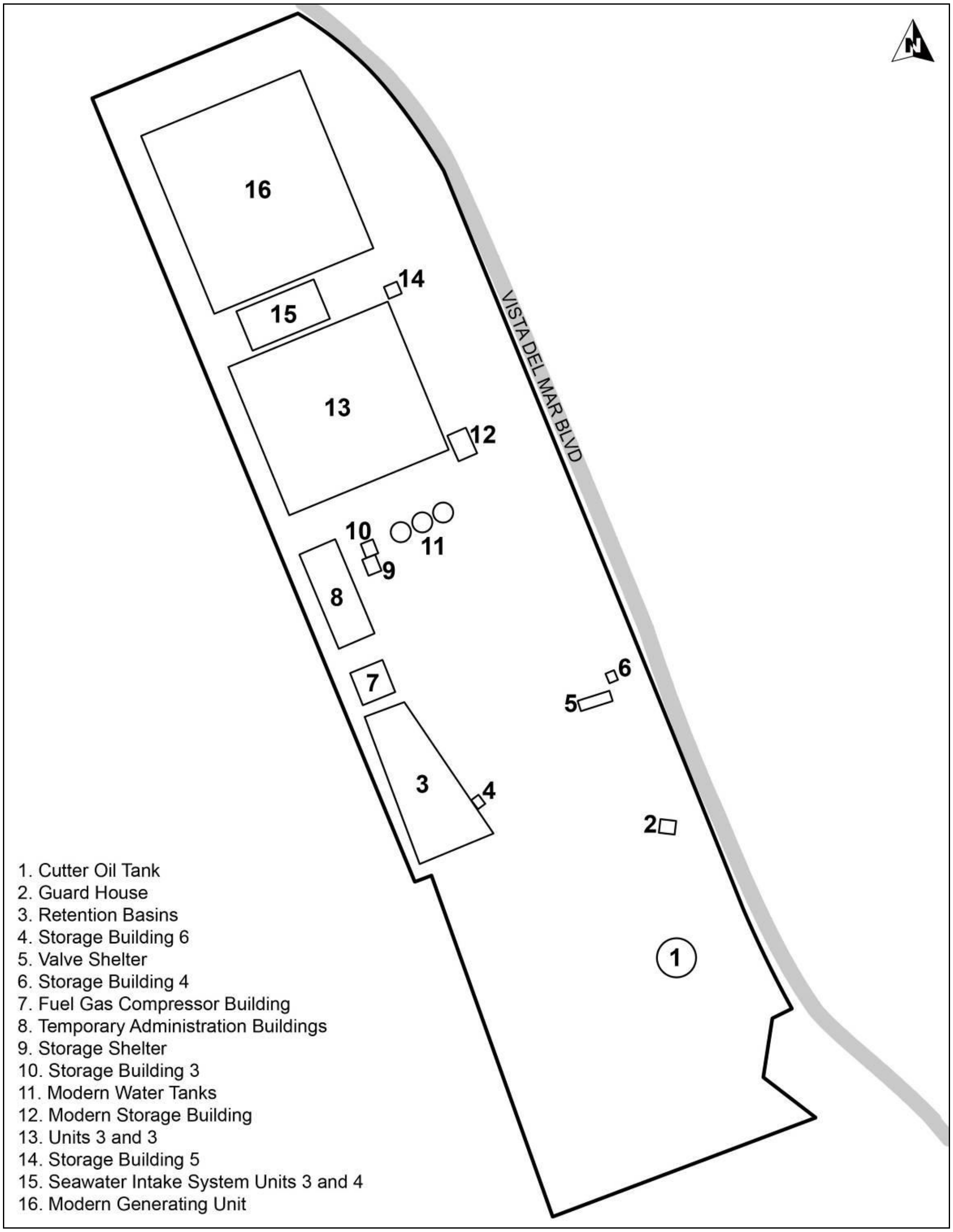
Photograph 23: Temporary administration buildings with modern fuel gas compressor building in background right, camera facing southeast, November 25, 2013.

State of California – The Resources Agency DEPARTMENT OF PARKS AND RECREATION **CONTINUATION SHEET**	Primary # ____ HRI # ____ Trinomial ____

 ***Resource Name or #** (Assigned by recorder): El Segundo Energy Center

***Recorded by:** S. J. Melvin ***Date:** November 25, 2013 ☒ Continuation ☐ Update

Site Map:



not to scale

APPENDIX C

Previous Report

HISTORIC EVALUATION OF THE EL SEGUNDO GENERATING STATION
EL SEGUNDO, LOS ANGELES COUNTY, CALIFORNIA

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October 2000

TABLE OF CONTENTS

1. INTRODUCTION

This historic evaluation report was prepared by JRP Historical Consulting Services under sub-contract to URS Greiner Corp. URS Greiner is preparing the Application for Certification (AFC) from the California Energy Commission for modifications to the El Segundo Generating Station in El Segundo, Los Angeles County, California. The purpose of this report is to evaluate whether the steam station qualifies for listing in the National Register of Historic Places or as a historic resource under applicable guidelines (Section 15064.5 (a)(2)-(3)) of the California Environmental Quality Act. The report concludes that the El Segundo Generating Station does not appear to meet the criteria for listing in the National Register and is not an important historic resource under CEQA.

2. DESCRIPTION OF THE UNDERTAKING

NRG Development Company, Inc. is submitting an AFC from the California Energy Commission to modernize its facilities at the El Segundo Generating Station. The El Segundo Power Station is a four-unit steam station, built between the mid-1950s and mid-1960s. Units 1 and 2 were completed by 1956 and units 3 and 4 by 1965. NRG proposes to demolish Units 1 and 2, except for the saltwater circulation systems. Following the demolition of these units, a new combined cycle power plant will be constructed on site with the addition of Units 5, 6, and 7 in locations previously occupied by Units 1 and 2.

The location and vicinity for this project are shown in **Figure 1**. For the purpose of this inventory, the Area of Potential Effects, or APE, is presumed to be the boundaries of the facility itself, which is shown in **Figure 2**. The undertaking will affect only a portion of the plant. As discussed below, however, this report inventories and evaluates the entire plant site, treating it as a complex in recognition that it has always operated as an integrated industrial facility.

3. DESCRIPTION OF THE RESOURCE

The El Segundo Generating Station is a natural gas-fired steam generating facility.[1] It occupies a site of about 33 acres in El Segundo, California. It is located on the coast, west of Vista Del Mar Boulevard, a short distance south of Los Angeles International Airport in southwestern Los Angeles County. The setting is generally industrial, with oil fields and oil refineries to the east and north of the facility. A beachfront residential community, the El Porto neighborhood of Manhattan Beach, exists immediately south of the facility. It is bounded on the west by the Pacific Ocean.

[1] This report uses the term "generating station," which SCE began to use in its Annual Reports in 1963. Prior to that time, these facilities were referred to as "steam stations" (Southern California Edison, 1963 Annual Report, 8).

There are numerous buildings and structures on the parcel for the El Segundo Generating Station. Consistent with National Register guidelines and standard professional practices, this integrated industrial facility is treated as a single resource for the purpose of evaluating its potential historic significance. The generating units, their appurtenant structures and equipment, and ancillary buildings are individually described below.

The general layout of the facility, which is comprised of several buildings and structures is shown in **Figure 2**. The components of the plant include: Units No. 1 and 2 (including a saltwater inlet and water supply tanks); Units No. 3 and 4 (also including a saltwater inlet and water supply tanks); the Administration Building; a warehouse; a paint shop and fire station; and major storage tanks for the complex as a whole. Other support functions, such as fire equipment sheds, vehicle garages, and a guard house are also shown in Figure 2 and all the components of the plant complex are addressed in the following descriptions.

Units 1 and 2. Although these units were installed under two contracts with Bechtel Corporation, their construction schedules overlapped and the two are unified structurally. For these reasons they are treated here as a single structure. A "unit" comprises the boiler as well as the turbogenerator, along with boiler stacks, fuel lines, cooling equipment, and other functional elements. Bechtel served as the engineer-contractor for the initial construction and installation of the plant in 1953-1956. Bechtel produced a completion report for Unit No. 1 in 1955, as well as a similar document for Unit No. 2 a few years later. Much of the structural information that follows is taken from these reports.[2]

Units No. 1 and 2, like essentially all SCE steam generation stations from the 1950s and 1960s, were designed as an "semi-outdoor" facility, i.e. much of the equipment is not sheltered within a building, as was commonly the case prior to World War II (**Photographs 1-2**). The basic structure of the plant is visually dominated by the boiler stacks, as well as the open steel framework that supports the boiler units themselves. This portion of the plant is large, ranging in height from more than 150 feet at the top of the boiler framework to the 200-foot tall stacks, dwarfing the other major components of the facility, such as the generators and operating deck, seawater intake well, and water supply tanks.

Bechtel described the main superstructure for the boiler of Unit No. 1 in 1956:

> The boiler area superstructure steel frame extends from foundation grade to elevation +157 and consists of shop riveted members field-bolted with hi-tensile bolts. This superstructure frame is supported on individual concrete spread footings with the eight major boiler support footings connected by reinforced concrete seismic tie girders doweled and keyed into the ground floor slab.[3]

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[2] Bechtel Corporation, "El Segundo Steam Station Unit No. 1, Completion Cost Report, Bechtel Job no. 2083," [1955]; Bechtel Corporation, "El Segundo Steam Station Unit No. 2, Completion Cost Report, Bechtel Job no. 2250," [1957]. Both reports are on file at the El Segundo Generating Station site office.

[3] Bechtel, "Unit No. 1, Completion Report," 6.

Subcontractor Consolidated Western Steel Company provided the materials and built the superstructure for both the auxiliary bay and the boiler area. C. C. Moore & Company installed the Babcock and Wilcox radiant boilers used in Units No. 1 and 2, each rated at 1,140,000 pound per hour with a 66-inch steam drum, oil-fired furnace, 16 wide range oil burners with ignition burners. The turbogenerators are located behind (east of) the boiler units and are visible at the ground and operating deck levels (**Photographs 2-3**). The generator support structure rests on a reinforced mass concrete foundation with reinforced concrete columns extending up from it to the bottom of the operating deck. Steel tie beams run under the generator section of this structure to support an intermediate deck for access to generator cooling controls. The operating deck is made up of heavy transverse beams for supporting the front and middle standard of the turbine and haunched longitudinal beams for supporting the main and auxiliary generators.[4] Various fans, air compressors, heat exchangers, switchgear, and pumps for salt water, cooling water, and chemical feeds are located in the ground floor area that is straddled by the massive boiler framework, as are the plant laboratory and locker room.

Steam generated by the boilers feeds into high, intermediate and low pressure turbines and involves being returned to the boilers to bring the steam back up to a temperature of 1,000°F between the high and intermediate pressure turbines. The General Electric turbine generators for Units No. 1 and 2 are tandem compound triple flow units, each rated at 156,250 KW at 30 psig (**Photograph 3**). The low-pressure turbine exhausts the steam into the main condenser (an Ingersoll-Rand 90,000 square foot, two-pass divided water box surface condenser). The condensate is reheated in a seven point feed water heater system that includes a 12,600 gallon storage tank, as well as two 126,000 gallon distilled water storage tanks that supply make-up water as necessary (**Photograph 4**). Electricity produced by the generators is conducted to General Electric power transformers, where the main generator output of each unit is stepped up to 220 KV transmission voltage for the switchyard. The original switchyard contained two suspension type busses designed to connect to leads from both Units No. 1 and 2, transmitting power to the La Fresa and Lighthipe substations, but was altered with the addition of Units No. 3 and 4 in the mid 1960s (see Switchyard description, below).[5]

The Consolidated Chimney Company built the reinforced concrete boiler stacks for Units No. 1 and 2, and the Los Angeles Cement Gun Company lined the stacks with gunite (**Photographs 1-2**). The Unit No. 1 stack was completed in October 1954, while the stack for Unit No. 2 was finished in early 1956.[6]

The original units were designed to run on high viscosity fuel oil (also known as petroleum pitch). This fuel is particularly thick and needs to be heated before it will flow efficiently through the power plant piping. Between the two 30,000-barrel insulated storage tanks at the south end of the plant site (described below), the oil was pumped through a heater and various pumping stations in steam traced lines, while unconsumed fuel was returned to the storage tanks. At the time they were installed, the boiler burners were ignited with propane, supplied by a 10,000-gallon storage tank that was located against the seawall near the northwest corner of the

[4] Bechtel, "Unit No. 1, Completion Report," 5-6, 11-12, and 29.

[5] Bechtel, "Unit No. 1, Completion Report," 11-12, and 16-18; Bechtel, "Unit No. 2, Completion Report," 19. The distilled water tank was furnished and installed by National Tank Manufacturing Company.

[6] Bechtel, "Unit No. 1, Completion Report," 29-30; "Unit No. 2, Completion Report," 19.

plant. The original design accounted for conversion to “a fuel gas system,” that would then rely on petroleum pitch as a stand-by fuel.[7]

In addition to the boiler units and generators, the Unit Nos. 1 and 2 superstructure includes a large gantry crane, which can be used for either of the units (**Photograph 2**). Two longitudinal beams within the operating deck support the crane rails and extend 55 feet north of the turbine generator structure to permit the 60-ton capacity crane to hoist material directly from the yard area to the operating deck. Bechtel installed the crane to assist with construction of the units and it has continued to serve in maintenance and repair of the massive generators and other equipment of the operations deck.[8]

Despite being a largely outdoor design, some areas of the Unit Nos. 1 and 2 plant are enclosed, creating its “semi-outdoor” designation. Circuit breakers and other electrical equipment and machinery located on the ground floor, are located within a welded structural steel frame building unit with concrete masonry unit curtain walls. The walls create a sheltered area also known as the “auxiliary bay” and are set with flush metal personnel doors (some set with wire glass) and metal roll-up doors, as well as pre-cast concrete frame louvered openings that appear at the top walls for ventilation (**Photograph 5**). Some blocks that had deteriorated have recently been replaced. The auxiliary bay rests on concrete spread footings just under and to the east of the larger boiler superstructure. Additional welded steel and concrete block units that house various other plant functions, including the control room, communication equipment room, heating/ventilating equipment room, and the locker room, rest on top of the auxiliary bay structure. Some of the equipment above these rooms is enclosed in ridged metal paneling that is visible within the steel boiler framework (**Photographs 1-2, and 5**).

<u>Saltwater inlet for Units 1 and 2</u>

The design of the El Segundo Generating Station includes a seawater cooling system. Pre-cast concrete intake pipes, 2,700 feet long and 10 feet in diameter, bring low temperature sea water into the Circulating Water Screenwell Structure located below grade, just to the west of the boiler superstructure of the facility (foreground, **Photograph 6**). The well structure consists of a reinforced concrete slab set 20 below the surface and encircled by heavy perimeter walls of the same material. The operating equipment includes two traveling water screens, four butterfly valves (recirculating controls), a trash rake, and two Byron-Jackson 48-inch circulating water pumps. These pumps discharge the cool water into 48-inch pre-cast concrete pipes that feed the plant’s condensers, while the warm circulating salt water is fed back to the crossover chamber in the screenwell. Warm water is returned to the ocean via another 10-foot diameter pre-cast concrete pipe that discharges about 2,500 feet offshore.

A control room located just off the northwest corner of the screenwell houses the intake structure controls (just left of center, **Photograph 6**). This small concrete masonry unit building rests on a concrete slab and is topped by a poured gypsum slab shed roof that overhangs the walls at the south and east elevations. This building is built against the original seawall (see description below), which is visible behind the building to the west and north. Multiple light industrial steel

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[7] Bechtel, “Unit No. 1, Completion Report,” 11.

[8] Bechtel, “Unit No. 1, Completion Report,” 5.

sash, with a central awning opening, appear in both the south and east walls. The east wall is also set with a flush metal personnel door and a pair of hinged flush metal equipment doors.

Units 3 and 4

Units No. 3 and 4 were constructed just to the south of the original plant in the mid 1960s and are connected to Units No. 1 and 2 via a steel frame catwalk at the operating deck level. The new units could produce just over twice the power of the original facility built ten years before (650,000 KW versus 320,000 KW) (**Photographs 7-8, and 24**). Although Units No. 3 and 4 would be computer-controlled, the basic structure and steam generation systems were very similar to the original plant and SCE selected many engineering and contractor firms for their previous experience with the site.[9] Bechtel served as the engineer-constructor for the construction of the new units, as it had for the first two. Bechtel performed the dewatering for the seawater intake structure and oversaw the rest of the construction, while subcontractor Clyde W. Wood & Sons returned to provide site preparation in May 1962 and soon began excavating and grading. Other major subcontractors for Units No. 3 and 4 included U. S. Steel, whose Consolidated Western Steel Division and American Bridge Division fabricated and erected the structural steel for the auxiliary bay. Amercon Corporation installed the steel superstructure that supports the boilers (drum type, with a continuous rating of 2,490,000 lb/hr of 2,462 psig at 1050° F, installed by Combustion Engineering, Inc.), while Custodis Engineering Company built the boiler stacks (**Photograph 9**). Like the first two stacks, those for Units No. 3 and 4 are about 200 feet tall and taper from 24 feet in diameter at the base to 14 in diameter at the top. The interior of the reinforced concrete structures is lined with between 1.5 and 2.5 inches of gunite.[10]

Most of the major operating components of Units No. 3 and 4 were manufactured by the same companies as the first two units. General Electric provided the two cross-compound, turbine generators for the project, each rated at 325,000 KW, and each with a 3,600 rpm high pressure/intermediate pressure turbine, and a 1800 rpm low pressure turbine (**Photograph 10**). Ingersoll-Rand built the condenser for Unit No. 4 (172,000 square feet); however the Unit No. 3 condenser was manufactured by Westinghouse (174,000 square feet). Both are two-pass, divided water box condensers. Bechtel installed a gantry crane to serve the new units, as it had with the first two, placing the 62-ton capacity crane on the east side of the operating deck (**Photograph 11**). Unit 3 went on line with the noted capacity in August 1964 and the fourth unit did so in 1965.[11]

<u>Saltwater inlet for Units 3 and 4</u>

Peter Kiewit Son's Company won the subcontract for installing the intake and discharge pipes for the seawater cooling system for Units No. 3 and 4 (**Photograph 12**). Kiewit first built a

[9] SCE announced that the third unit of its Huntington Beach Steam Station, which went on-line in late 1960, was "the first computer-automated steam-electric generating unit in the world" (Southern California Edison, 1960 Annual Report, 8).

[10] "Edison Steam Station Expands," *Southwest Builder & Contractor* (November 8, 1963), 12-15, 32; Bechtel, "Unit No. 2, Completion Report," 20-21.

[11] Bechtel, "Unit No. 2, Completion Report," 21-24.

temporary construction trestle and then installed a temporary sheet piling wall to protect the project from wave action, before installing the 24-foot long, 12-foot in diameter sections of pipe. A gantry crane lowered the sections from the trestle, where divers guided the pipe into position and bolted it to the previous section. At completion, the intake line was about 2,600 feet long, while the discharge was about 2,100 feet long, each ending in a 45-foot tall terminal structure. The control house for the screenwell for this intake structure, a concrete masonry unit building with a shed roof, is visible in **Photograph 17**.[12]

Sea Wall

A subcontractor, Macco Corporation, installed a steel sheet pile gunite encased seawall with ocean-side rip-rap west of the Units No. 1 and 2 facility in 1955-1956 (visible behind the screenwell control house, **Photograph 6**). The walls were intended to help protect the power plant and service structures from high seas. This type of protection was later determined to be unnecessary and a gate leading to the employee recreation area was installed in the center of the northern portion.[13]

Fuel Storage Tanks

These massive storage tanks date to the original plant construction in the mid 1950s, when the first units were fueled by petroleum pitch, or fuel oil (**Photograph 13**). Chicago Bridge & Iron Company furnished and erected the two 30,000-barrel capacity welded steel tanks. The insulated tanks are encircled by steel bands and each has a conical steel roof, with exterior mounted steel stairs. These huge steel cylinders rest on concrete foundations and are surrounded by large earth embankments treated with a blown on sealant and asphalt. Just to the east of the two large tanks is the much smaller cutter oil tank (**Photograph 14**). The "cutter" material was added to the heavier fuel to allow the pitch to flow more efficiently. Just down slope to the northwest from the tanks is the earthen retention basin.

By the time that SCE was installing Units No. 3 and 4 at El Segundo in the mid 1960s, the company was well on its way to converting from using petroleum pitch (or fuel oil) as its primary fuel for steam generating plants, to using natural gas. In 1964, SCE reported that it had generated 77% of its steam power with natural gas, and two years later noted that expansions at its Redondo station would "use natural gas when available, with oil as standby fuel." Expanded use of natural gas continued and the three new units that SCE completed in 1969 (at Etiwanda, Huntington Beach and Alamitos) were all gas-fired. It appears that the El Segundo units were converted to natural gas during this same period, and by the 1970s used the heavier fuel oil as a standby only. Currently, the facility no longer uses the large fuel oil tanks at the southern end of the plant site.[14]

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[12] "Edison Steam Station Expands," 15; "Lightweight Pipe Saves Money at Steam Plant," *Southwest Builder & Contractor* (October 11, 1963): 74-75.

[13] Bechtel, "Unit No. 1, Completion Report," 9, 30; Bechtel, "Unit No. 2, Completion Report," 19-20.

[14] Bechtel, "Unit No. 1, Completion Report," 11; Southern California Edison, 1964 Annual Report, 9; Southern California Edison, 1966 Annual Report, 9; Southern California Edison, 1969 Annual Report, 4.

Switching Yard

The transmission voltage of 220 KV feeds from the plant transformers to the switching yard that was originally installed during construction of Units No. 1 and 2 in 1955. At that time, the yard contained two suspension type busses with leads from both units, and two transmission lines from the yard led to Southern California Edison's La Fresa and Lighthipe substations. The 1964-1965 addition of Units No. 3 and 4 included complete rearrangement of the switchyard. Bechtel noted that the "rebuilt 220 KV switchyard contains two buses (north and south), which are non-sectionalized." After rearrangement, two lines led from the switchyard: El Nido Number 1 transmission line and El Nido Number 2 transmission line.[15]

Administration Building

The single story Administration Building is located just east of Units No. 1 and 2 (**Photograph 15**). It is a "concrete block bearing-wall structure 82 feet by 56 feet in plan. It has a poured-in-place structural gypsum roof deck supported by a structural steel roof frame system." Bechtel completed the building in 1955, as part of the initial construction project at the site and its concrete block wall and slab roof are typical of the small support buildings erected during the first phase of construction. The large fixed anodized aluminum frame windows in the north and south elevations are replacement sash installed in the late 1980s.[16]

Warehouse / Shop

Bechtel also completed the shop and warehouse building (90 feet by 150 feet) in 1955, noting that about half of the space would be devoted "to warehousing, 4,400 square feet to shop functions, and 2,400 square feet to locker and lunch room facilities." Its basic structural details were designed to be "identical to those of the administration building." The steel frame windows of the locker/lunch room portion of the building remain; however, several of the small windows of the warehouse at the west end, and the shop area at the east end, have been replaced with anodized aluminum sash (**Photograph 16**).[17]

Instrument Shop

The Instrument Shop, which houses various electrical testing activities, was built in the mid 1960s at the time of the installation of Units No. 3 and 4 (**Photograph 17**). This building has an asymmetrical plan, a flat roof, and consists of concrete masonry unit construction. The east elevation is set with replacement anodized aluminum frame windows, flush metal personnel doors, and a roll-up freight door.

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[15] Bechtel, "Unit No. 1, Completion Cost Report," 16-17; Bechtel, "Unit No. 2, Completion Cost Report," 25-26.

[16] Bechtel, "Unit No. 1, Completion Cost Report," 8, 23-24.

[17] Bechtel, "Unit No. 1, Completion Cost Report," 8, 24.

Miscellaneous buildings and structures

In addition to the aforementioned major buildings and structures, the El Segundo Generating Station site includes a variety of small buildings and structures.

The initial construction project for Units No. 1 and 2 included a fire equipment house with an attached degreaser structure, two hose houses, an insulating oil house and a guard house. All of these buildings were constructed of concrete masonry units with shed roofs and rest on concrete slab foundations (see **Photographs 18-19**, as well as lower left of both **Photograph 1 and 20**). Fire equipment, as well as degreasing and sandblasting facilities are housed in the composite structure just north of the Shop / Warehouse building.

Two urea tanks (**Photograph 20**) are located midway along the western edge of the property, south of Units No. 3 and 4. Used as at one time as part of an emission control program, the system has since been discontinued and the tanks are no longer used. The Service Water Storage Tank (**Photograph 21**) provides domestic and fire protection water and is located at the northern boundary of the site. Chicago Bridge & Iron Company furnished and erected the service water tank (they also built the two large fuel oil storage tanks) during construction of Units No. 1 & 2 in the mid 1950s.

Two vehicle shelters are located along the western edge of the plant site, the smaller garage near Units No. 1 and 2, and the larger one near Units No. 3 and 4 (**Photograph 22**). The larger garage consists of three concrete masonry unit walls topped by a shed roof supported on metal posts that line the open elevation. A small enclosed shop area with sliding metal panel doors is located at the south end of this garage. The smaller garage is built directly against the original sea wall, which functions as the rear (west) wall of the building. The remaining two walls of the open-sided garage are concrete masonry unit construction.

The Demineralizing Building is a prefabricated metal framed building sheathed in ridged metal panels and topped by a shallow gable roof (**Photograph 23**). It is located just south of Unit No. 4. This building is no longer used for this purpose and portable demineralizing equipment has been installed adjacent to its north side.

Other components of the El Segundo Generating Plant include two below-grade sewage treatment facilities, located near each pair of generating units; an employee recreation area located along the western edge of the property west of Units No. 1 and 2[18]; and a hydrochloride storage building (a concrete masonry unit shed near the intake for Units No. 3 and 4).

[18] The landscaped recreation area includes a fenced lawn with perimeter plantings and was dedicated to former plant employee Ralph Romero in 1993.

4. HISTORIC CONTEXT

The El Segundo Generating Station was built by the Southern California Edison Company (SCE) in the 1950s and 1960s, with two units coming on line in 1955 and 1956 and another two in 1964 and 1965. This section will present background information to support an evaluation of the El Segundo facility in the larger context of the history of SCE, as well as within the history of oil and gas-fired steam electric generation in California. The section will close with a brief summary of the history of the El Segundo station itself.

4.1. General History of Southern California Edison Company

During the first half of the 20th century, the Southern California Edison Company emerged as the dominant utility in Southern California, achieving a presence in the southland that approximated that of the Pacific Gas & Electric Company in Northern California. Like the PG&E, SCE grew chiefly through acquisition, buying or merging with numerous pioneering electrical and gas companies in the region. Although several dozen small companies were folded into this utility, the principal assets came from three firms: Southern California Edison Co., which was organized in 1909; the Pacific Light & Power Company, organized in 1902 and which rivaled Southern California Edison when the two companies merged in 1917; and the California Electric Power Company (often called Calelectric), which combined a number of small companies in 1941 and was merged into SCE in 1964.[19]

Throughout its history, SCE and its predecessor companies have been known for technological innovation. These dozens of predecessor companies were responsible for numerous groundbreaking developments in the larger field of electric power generation. The earliest plants by predecessor companies were small steam plants in Visalia and Santa Barbara, both constructed in the mid-1880s. Within just a few years, however, various predecessor companies began to construct hydroelectric plants and for half a century, the SCE and its predecessors were most closely associated with innovations in hydroelectric power generation. The San Antonio Light and Power Company, for example, is widely credited with developing the first “step-up, step-down” transformers to transmit power from its plant in San Antonio Canyon. This company would merge into the Pacific Light & Power Company before it was acquired by SCE. The Mill Creek plant near Redlands is regarded as the origin of three-phase alternating current transmission, creating an industry standard.[20] The Southern California Edison Company would build numerous record-breaking high-head hydroelectric power facilities, including two on the Kern River during the 1910s and 1920s.[21] The Pacific Light & Power Company gained

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[19] These numerous predecessor companies are shown in a chart in: William A. Myers, *Iron Men and Copper Wires: A Centennial History of the Southern California Edison Company* (Glendale, CA: Trans-Anglo Books, 1983).

[20] These pioneering plants are discussed in all major histories of the hydroelectric industry. See, for example, Norman A. F. Smith, *Man and Water: A History of Hydro-Technology* (New York: Scribner’s, 1976).

[21] Stephen D. Mikesell, “Historic Resource Evaluation Report, Kern River No. 1 Power House,” prepared for the California Department of Transportation, August, 1988; Stephen D. Mikesell, “Kern River No. 3 System,” National Register of Historic Places Registration Form, July 28, 1989, prepared for Entrix, Inc., and the Southern California Edison Company.

international attention in the 1910s when it built its massive Big Creek Project, one of the most impressive hydroelectric power generation facilities in American history.[22] Not surprisingly, many of the pioneering SCE hydroelectric plants have been found the qualify for listing in the National Register of Historic Places on the basis of their innovative contribution to electrical, structural, and hydraulic engineering.[23] The SCE was also able to distribute hydroelectric power generated by others, including power from Hoover Dam.

Given this massive investment in hydroelectric plants, SCE and Calelectric relied principally upon hydroelectric power to satisfy the demands of its customers, at least as long as it was possible to do so. William Myers, the principal historian of SCE, notes that "until World War Two, both Edison and Calelectric were predominantly hydro companies, with steam essentially used in standby service to meet peak demands or emergency situations."[24]

This situation would change drastically during World War II and even more dramatically after the war, with steam emerging as the mainstay energy source and hydroelectric being relegated to a standby provider. Many historians argue that World War II changed life in California more profoundly than any development since the Gold Rush.[25] This transformation was especially notable in the Los Angeles Basin, where aircraft manufacturers and other war-related industries induced a fantastic growth in the population and economy of the region. This trend did not subside with the end of the war. Indeed, the population of the basin grew even faster during the late 1950s than it had during the 1940s.

SCE and Calelectric became the fastest growing utilities in the nation during the early post-war era. The phenomenal growth of the region quickly outstripped the capacity of the utility to meet demand with its traditional hydroelectric plants. The company did expand its older hydroelectric facilities, especially Big Creek.[26] It was unable to build major new hydroelectric plants, however, simply because virtually every usable dam site had already been taken, either by SCE, the Pacific Gas & Electric Company, or by the federal or state government.

Over the next several decades, SCE and Calelectric (the two merged in 1964) built dozens of thermal power plants (oil or gas-fired steam plants) throughout Southern California, in an attempt to meet the new demand. In time, the company would construct nearly every type of technology that was practicable at the time, from nuclear to geothermal to solar. In the short term of the 1950s and 1960s, however, the company turned to a known technology: steam generation, fired by oil or natural gas or, in rare instances, with coal. SCE was not alone in this embrace of thermal power. As discussed below, SCE, PG&E, and the San Diego Gas and Electric Company all began to build oil or gas-fired steam plants during this period. In 1950,

[22] Numerous histories exist for the Big Creek project, including: David H. Redinger, *The Story of Big Creek* (Los Angeles: Angelus Press, 1952).

[23] Both Kern River 1 and 3 have been found to qualify for the National Register, as has the Big Creek Project.

[24] Myers, *Iron Men and Copper Wires,* 208.

[25] The importance of World War II to the economics and demographics of the American West is discussed in: Gerald D. Nash, *The American West Transformed: the impact of the Second World War* (Bloomington: Indiana University Press, 1985).

[26] Big Creek was expanded in the late 1940s and early 1950s, spending about $21 millions to increase the capacity by 84 MW. W. L. Chadwick, "Load Capacity of Southern California Edison Company to 2 ¾ Billion Kwhr per Year," *Civil Engineering* 20 (May 1950): 314-315.

steam generated electricity for the first time accounted for nearly 50 percent of the state's electricity.

In time, SCE would build at least 12 steam plants at various locations, chiefly along the coast in Los Angeles County and in various inland locations. SCE operated these plants for more than 40 years before divesting nearly all of its steam plants in 1977. The divested plants included: Alamitos in Long Beach; a plant in Huntington Beach; a plant in Redondo Beach; a plant in Barstow; a plant in Ventura; a plant in Goleta; a plant in Etiwanda (San Bernardino County); a plant in San Bernardino; the subject plant in El Segundo; and plants in Long Beach and Oxnard.[27]

In addition to its gas and oil-fired steam plants, the SCE made substantial investments in nuclear power. In 1957, it became the first private utility to generate electricity on a commercial scale from a nuclear power plant. The facility was a small experimental station, called the Santa Susana Experimental Station, in Ventura County.[28] The success of this pilot plant led the company to build the major nuclear plant at San Onofre, in cooperation with the San Diego Gas and Electric Company, which owned 20 percent. Construction began in 1963 and the plant went on line in 1967. The plant was greatly expanded in the 1970s and is still producing electricity.

In more recent years, the SCE has begun to divest itself of its operating plants, choosing to be a distributor rather than a creator of electric power.

4.2. General History of Steam Plants in California

As noted earlier, steam plants comprised the first generation of electric generating facilities in California. The earliest such plants were little more than steam engines converted to drive a generator rather than a locomotive. The state never stopped relying upon steam generation, although the importance of steam diminished considerably during the 1920-1940 era, when massive hydroelectric generating capabilities came on line.

In 1920, hydroelectric power accounted for 69% of all electrical power generated in California. In 1930, that figure had risen to 76%; it rose again to 89% in 1940. Rapid construction of new thermal units, however, accounted for most of the new power capacity in the state after 1941. By 1950, hydroelectricity accounted for only 59% of the total, a figure that fell to 27% in 1960. Some new hydroelectric plants were built during the 1960s, chiefly associated with federal and state water projects, but by 1970, hydro still accounted for only 31% of all electricity generated in California.[29]

The statewide trend is reflected in trends for SCE, which represent a major part of the statewide total for hydro as well as thermal energy. At the start of World War II, SCE had only one steam

[27] "Edison Sells 10 Gas-Fired Plants," *Los Angeles Times* (November 25, 1997): D-2.

[28] Myers, *Iron Men and Copper Wires*, 212.

[29] James C. Williams, *Energy and the Making of Modern California* (Akron, Ohio: University of Akron Press, 1997), 374.

powered facility, its plant at Long Beach on Terminal Island. It was, however, a massive operation, with 11 units on line. These units had been constructed in stages, beginning in 1911. The first three units, completed by 1917, originally burned a heavy fuel oil.[30] These units performed yeoman duty during the drought of the 1930s. New units were added throughout the 1920s and 1930s; nine units were in place by the mid-1930s. During World War II, the plant was shifted to natural gas, not for pollution control purposes but because the natural gas was more plentiful than petroleum, which was quite scarce.

As noted, the company made massive new investments in steam power in the two decades after the conclusion of World War II, as electrical supplies fell far short of demand. The company was not alone in this regard. The Pacific Gas and Electric Company made similar investments in steam plants throughout Northern California because it too had exhausted the supply of usable hydroelectric dam sites. By the late 1970s, there were more than 20 fossil fuel thermal plants in California, clustered around San Francisco Bay, in Santa Monica Bay, and in San Diego County, along with a few interior plants in San Bernardino County and Riverside and Imperial Counties, as well as a few plants on the Central Coast.[31]

The dozens of new steam generation plants were built throughout California, chiefly by PG&E and SCE, although the San Diego Gas and Electric Company built a few as well. The plants relied upon proven technologies but were assembled quickly and inexpensively, relative to earlier plants. In a detailed article in *Civil Engineering*, I. C. Steele, Chief Engineer for the PG&E summarized the design criteria that went into construction of four major steam plants the company had under construction at that time, at Moss Landing, Contra Costa, Kern, and Hunters Point in San Francisco. These plants had much in common, he argued, with each other and with other steam plants under construction in the state. All were designed and built by firms outside the utility. Bechtel designed one plant and Stone & Webster Engineering designed the others. The design criteria were the same in all cases: to build the facility close to load centers to reduce transmission costs; to be close to fuel supplies; to be near a water supply; and to be on a site where land was cheap and could support a good foundation.[32] In another article in *Transactions of the ASCE,* an engineer from Bechtel detailed the economics of steam plant design from this era. These plants, he argued, could be built economically by minimizing the structural material, chiefly by creating "outdoors" turbo-generator units.[33] Virtually all of these plants were designed to be expanded if market conditions warranted; most of them were.

The El Segundo Generating Station of SCE was built during the peak expansion of steam generating capacity for both the SCE and the PG&E. The SCE built a series of very similar steam plants in the Los Angeles Basin and in San Bernardino County throughout the 1950s and early 1960s. The frenzied pace of construction is summarized in the company's annual reports for these years.

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[30] Myers, *Iron Men and Copper Wires*, 49.

[31] Williams, *Energy and the Making of Modern California*, 257.

[32] I. C. Steele, "Steam Power Gains on Hydro in California," *Civil Engineering* (January 1950): 17-21; Edgar J. Garbarini, "Design Saves Construction Dollars on Contra Costa Power Plant," *Civil Engineering* (May 1953): 31-33.

[33] Walter L. Dickey, "The Design of Two Steam Electric Plants," *ASCE Transactions* (1956): 253-273.

In 1951, the company built a plant at Etiwanda, planned initially for two units but with provision for expansion.[34] In 1952, it began work on Redondo No. 2, which was adjacent to an earlier plant at Redondo Beach. In 1953, the Etiwanda plant went on-line. In 1954, the Redondo No. 2 plant went on line. In 1955, the first unit of the El Segundo Generating Station went on line and construction was initiated for a similar plant at Alamitos in Long Beach. In 1956, the second El Segundo unit went on-line, as did the first unit at Alamitos. In 1957, a second unit at Alamitos went on-line, as did a sixth unit at Redondo. New facilities were planned that year for Huntington Beach and Mandalay, in Los Angeles and Ventura counties respectively. In 1958, units at Huntington Beach and Mandalay went on line. In 1959, additional units at Mandalay went on line. In 1960, new units were installed at Huntington Beach and Alamitos, and new units were planned for the Etiwanda facility. In 1961, a new unit was installed at Huntington Beach and Alamitos, while new facilities were planned for Alamitos, Etiwanda, and El Segundo. In 1962, construction continued at Alamitos and Etiwanda and work was initiated at El Segundo. In 1963, work was completed at Etiwanda and Alamitos. The third unit at El Segundo went on line in 1964, as was Cool Water Unit No. 2. The fourth unit at El Segundo went on line in 1965. In 1966, new units were ordered for Mandalay, Alamitos, Huntington Beach, and Etiwanda.

Not surprisingly, these new units were very similar to each other. The company invested hundreds of millions of dollars in this expansion and benefited from economy of scale by purchasing units that were similar, although not entirely identical. The similarity of these units is most readily apparent from the look of the plants and from their description in SCE annual reports. The general appearance of each unit is remarkably similar. Their individual capacities, however, differed based upon the equipment installed. It appears that the company exercised its purchasing power by ordering several identical units each year. For example, in 1956, the company initiated construction on four units, one at El Segundo, two at Alamitos, and one a Redondo. The four had identical capacities (165,000 KW each) and nearly identical cost (each about $20 million). In 1958, the company installed four units (two each at Huntington Beach and Mandalay), each with an identical capacity of 200,000 KW. In 1961, the company ordered four units (one for Alamitos, two for Etiwanda, and one for El Segundo), each with an identical capacity of 310,000 KW. Similar trends prevailed in other years as well. In addition to ordering identical units each year, the general trend was toward larger and larger units, a fact that is illustrated in the four units that were installed at El Segundo.

Most of the oil- or gas-fired steam plants currently in use in California were installed in the period from about 1950 through 1970. After 1970, the major utilities began to look for alternative energy sources, ranging from nuclear power to wind, geothermal, and other "green" energy sources, other than hydroelectric. Despite these efforts, however, fossil fuel steam generation remains the backbone of electrical generating capacity in California.[35]

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[34] These conclusions are from the Annual Reports of the Southern California Edison Company, various years as noted in the text.

[35] The California Energy Commission retains figures on the fuel type for all electricity used in the state, even if the power is generated out of state. In 1999, natural gas-fired generators were responsible for 31% of all electricity used in the state, compared with 20% for hydroelectricity. Coal-fired steam plants, all of them out of state, accounted for 20% of the total. "Green" sources accounted for 12%. The percentage of in-state natural gas-fired steam electricity is much larger than 31%, since all of the coal and much of the hydroelectric power is generated out of state. See www.energy.ca.gov/electricity/system_power.

4.3. History of the El Segundo Generating Station

The El Segundo Generating Station was built in stages between 1953 and 1965, in the midst of a great expansion of the oil- (later gas-) fired steam generating capacity of the SCE. Although construction of the plant was started in late 1953, it was first mentioned in the 1954 Annual Report. Throughout the 1950s, SCE saw El Segundo as a two-unit station; not until the 1960s did the company begin to plan for an addition two units there. The pertinent entry in the 1954 Annual Report reads: "a tidewater steam station consisting of two units, each with an anticipated rating of 160,000 kilowatts, was started at El Segundo in October 1953. The first unit is scheduled for completion in July 1955 and the second in September 1956. As its principal fuel the El Segundo station will use high viscosity fuel oil from an adjacent refinery. The station is expected to cost $45,000,000."[36]

SCE awarded the overall engineering-constructor contract for the El Segundo plant to the Bechtel Corporation of Los Angeles who acted as the field construction organization. Bechtel supervisors oversaw civil, mechanical, and electrical field engineering, as well as providing primary construction workers, although SCE also contracted with many other local firms for various aspects of the work. One of the first subcontractors to work on the project was Silva & Hill Construction Company who relocated Coast Boulevard (later renamed Via Del Mar Boulevard) to create more room for the plant between the beach and the bluffs below the refinery property to the east. Other major subcontractors for the project included Consolidated Western Steel Company (boiler superstructure manufacture and construction), Consolidated Chimney Company (boiler stacks), and C. C. Moore & Company (installation of steam generator). By the time SCE issued its 1955 Annual Report, the company reported that "the first unit at El Segundo Steam Station began commercial operation in May 1955, approximately one and one-half years after its construction commenced. The unit, which is the first of two at this location, cost approximately $24,000,000 and has an effective operating capacity of 175,000 kilowatts." Construction of Unit No. 2 dovetailed with this activity when Bechtel started the foundation work on the 165,000 KW unit in December 1954. Meanwhile, SCE was expanding other plants, such as Redondo Beach where the company installing a sixth unit at Redondo Beach.[37]

The 1956 Annual Report continued to treat El Segundo as a two-unit facility: "The second and final unit at El Segundo Steam Station began commercial operation in August, 1956."[38] The plant is not mentioned again until 1961. The Annual Report of that year notes that: "The Company has four additional steam units under construction or planned …" and lists El Segundo Unit No. 3 as a 310,000 KW facility, planned for completion in September 1964.[39] In 1962, the company announced that it was planning to install two new units (units 3 and 4) at El Segundo in

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[36] Bechtel, "Unit No. 1, Completion Cost Report," 18; Southern California Edison, 1954 Annual Report, 13.

[37] Bechtel, "Unit No. 1, Completion Cost Report," 29-31; Bechtel, "Unit No. 2, Completion Cost Report," 15; Southern California Edison, 1955 Annual Report, 12.

[38] Southern California Edison, 1956 Annual Report, 12.

[39] Southern California Edison, 1961 Annual Report, 8.

1964 and 1965, each with a scheduled capacity of 320,000 KW. The 1963 Annual Report noted that the two units were under construction, each with a scheduled capacity of 325,000 KW. [40]

Bechtel served as the engineer-constructor for the project, as it had for the first two units, and some of the subcontractors chosen for work on Units No. 3 and 4 had also worked on the earlier project. For example, Clyde W. Wood & Sons won the contract for site preparation in May 1962 and soon began excavating and grading, Bechtel performed the dewatering for the seawater intake structure and oversaw the rest of the construction, while Custodis Engineering Company built the boiler stacks. Unit 3 went on line with the noted capacity in August 1964 and the fourth unit did so in 1965 (**Photograph 24**).[41]

The El Segundo facility has been in commercial operation since its first phase of construction in the mid-1950s. The units were all converted to natural gas during the 1970s for purposes of reducing emissions. In 1997, the units were sold by SCE as part of a larger program of divestiture. The El Segundo Station was sold at auction to the current owners as part of a massive auction in which all but two of the SCE gas-fired steam plants were sold.[42]

5. APPLICATION OF THE CRITERIA OF THE NRHP AND CEQA

The four-unit steam generating power plant at El Segundo does not appear to meet the criteria for listing in the National Register of Historic Places (NRHP) and is not a historic resource as that term is used in the guidelines of the California Environmental Quality Act ((Section 15064.5 (a)(2)-(3)), known as CEQA.[43] Furthermore, the property is less than 50 years old and is not exceptionally significant in the context of the development of the SCE, nor as an example of a steam power plant from the post-war era.[44] Lacking exceptional significance, the property does not appear to meet the criteria for listing in the National Register and is not an important historic property under CEQA.

Eligibility to the National Register of Historic Places rests on twin factors: *significance* and *integrity*. A property must have both significance and integrity to be considered eligible for listing on the National Register. Loss of integrity, if sufficiently great, will overwhelm the historical significance of a resource and render it ineligible. Likewise, a resource can have complete integrity, but if it lacks significance it will also be considered ineligible.

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[40] Southern California Edison, 1962 Annual Report, 8; Southern California Edison, 1963 Annual Report, 8.

[41] "Edison Steam Station Expands," *Southwest Builder & Contractor* (November 8, 1963): 12-15, 32.

[42] "Edison Sells 10 Gas-Fired Plants," *Los Angeles Times* (November 25, 1997): D-2.

[43] The NRHP and CEQA both require that historic properties be identified and evaluated by following standardized guidelines and applying significance criteria. Because CEQA guidelines are based on those of the NRHP, the two are nearly identical. For the sake of clarity, this report outlines the NRHP evaluation process; nevertheless, both NRHP and CEQA guidelines were applied in the preparation of this report.

[44] NPS, "Guidelines for Evaluating and Nominating Properties that Have Achieved Significance Within the Past Fifty Years," *National Register Bulletin No. 22* (Washington, D.C.: GPO, revised 1996).

Historical significance is judged by application of four criteria:

> Criterion A: association with "events that have made a significant contribution to the broad patterns of our history;"
>
> Criterion B: association with "the lives of persons significant in our past;"
>
> Criterion C: resources "that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction;" and
>
> Criterion D: resources "that have yielded, or may be likely to yield, information important to history or prehistory."

Integrity is determined through application of seven factors: location, design, setting, workmanship, materials, feeling, and association. In addition, a resource must be at least 50 years old in order to be eligible to the National Register, unless it meets specific and exacting criteria for special significance. The procedures for evaluating historic resources are explained in bulletins issued by the National Park Service, including *Bulletin 15*, "How to Apply the National Register Criteria for Evaluation."[45]

The El Segundo Generating Station is not associated with an event important within the broad patterns of our history (Criterion A). While this property is a component of a larger power generating and delivery system operated by SCE, is does not appear to represent an exceptionally important property within the context of the development of the Southern California Electric Company. As discussed in the historic context (Section 4), SCE and its predecessor companies were pioneers in many aspects of electrical, mechanical, and hydraulic engineering. Some of the most noteworthy innovations were in the area of hydroelectric power. Many of the key innovations in hydroelectric power generation have been recognized through determinations of eligibility for listing in the National Register of Historic Places. The Mill Creek facility, for example, has been found to qualify for listing in the National Register as a small historic district.[46] Kern River #1 and Kern River # 3 have been found to qualify for listing in the National Register, again as historic districts. The Big Creek Project has been found to qualify for the National Register as a series of historic districts, reflecting the tremendous complexity of that facility. The hydroelectric legacy of the company, then, has been commemorated through the National Register program.

It appears that the company also made important contributions to the field of nuclear power. SCE's Santa Susana Experimental Station is thought to have been the first private utility plant to sell electric power generated through nuclear means. It is not known whether this station still exists. If so, the property should be considered to have potential for exceptional significance within the context of the development of SCE and the larger field of nuclear power generation.

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[45] CFR Title 36, Part 60; NPS, *National Register Bulletin No. 15*, "How to Apply the National Register Criteria for Evalution," (Washington, D.C.: GPO, 1991).

[46] These conclusions are drawn from the California Historical Resources Information System (CHRIS) database for the appropriate counties, maintained by the California Office of Historic Preservation.

The El Segundo Generating Station, by contrast, does not appear to have made an exceptionally significant contribution to the development of this company. As discussed in Section 4, SCE built new steam plants at a frenzied rate during the period from the 1950s to about 1970, the time period in which the four El Segundo units went on line. Collectively, these many steam plants helped the company survive through a period of great economic and demographic growth. The plants also helped sustain the local economy and population. Within that context, however, this plant did not make an exceptionally important contribution to the history of this company, or even an important contribution when seen within the larger context of the firm. The El Segundo Generating Station was one of a dozen steam plants that helped the company accommodate the great growth of electrical demand in Southern California during the post-war era. The station was not the largest of these plants; it appears to be the smallest. It was not the earliest, nor was it the last of this group. It was, in fact, typical of the group: it was built in the 1950s and 1960s; was built sequentially, adding the units in phases; had a substantial power generating capacity; and was sited to be near the major power load centers as well as near water sources that could be used for cooling.

In considering the impact of this power plant on the local economy, it is necessary to appreciate the property in the context of similar resources. It is in the nature of public utilities, as with public works projects, that the benefits of these improvements are widely distributed. Every power generating facility delivers a useful product to a broad market, as does every highway, airport, sewer system, and other utility and public works undertakings. Analyzed at face value, every improvement made by a utility or public works agency may be seen as having made an important contribution to the community it serves. These types of properties, however, must be appreciated in the context of like properties, to avoid trivializing the elements of what constitutes significance for the property type. The question is not whether the El Segundo Generating Station made a useful contribution to the local economy; it obviously did. The question rather is whether the station made a contribution that is significant within the context of other properties of its type.

In this context, the El Segundo Generating Station is by any reasonable measure a typical example of its type. According to the records of the California Energy Commission, the plant has a capacity of 1020 MW. In this regard, it is a large but not exceptional aspect of the power generating capacity of SCE and is a typical but not exceptional SCE steam plant from this period. The steam plants built by SCE between 1945 and 1965 range in their capacity from about 1000 MW to about 2100 MW. The Alamitos station in Long Beach is by far the largest of these, with a capacity of 2120 MW. Other plants from this era include Redondo Beach, with a capacity of 1310 MW, Etiwanda at 1049 MW, and Ormond Beach at 1500 MW. It appears that the El Segundo Generating Station is actually the smallest of the various plants built by SCE during this era, although by a small differential. The facility's capacity, however, is less important than the general similarities among the various elements of the SCE steam generating system. The El Segundo station was one of many plants the company brought on line during this period and is typical of these plants, albeit having a slightly smaller capacity than the others. In terms of its role in the history of the company, this plant does not appear to have made an exceptionally significant contribution.

In addition, it does not appear that the plant is exceptionally significant within the context of steam generation plants in California, whether seen in the long history of the area, or in the more limited context of steam plants during the immediate post-war era. Steam generation of electricity dates to the late 19th century. As noted earlier, the earliest power plants of SCE and its predecessor companies were small steam plants, some constructed as early as the mid-1880s. Steam generation, however, fell out of favor during the period from about 1900 through the 1940s, as SCE and other California utilities built numerous low-cost hydroelectric facilities to take advantage of the high-head capabilities in the mountainous regions of the state.

The resurgence of steam power generation in California after 1945 reflects a simple fact: all of the best hydroelectric power generation sites had already been taken, either by PG&E, SCE, or the various state, federal and local water development agencies, who were in the midst of a massive program of dam development throughout the 1940s, 1950s, and 1960s. These public projects would bring a great deal of new hydroelectric power on line. Between 1945 and 1970, the amount of hydroelectric power generated in the state would more than triple, from 11 million kilowatt hours to nearly 38 million kilowatt hours.[47] Most of this new hydroelectric capacity, however, was associated with the power plants of the huge dams that were completed during this era, by local, state, and federal water development agencies. The investor-owned utilities were denied access to these dam sites and most of the economical upstream sites had already been developed by these utilities. There were a few privately built hydroelectric facilities constructed during the post-war era, but these were relatively unimportant compared to other types of power stations.

Both the PG&E and SCE built dozens of steam plants during the first two decades after the conclusion of World War II. Primary and secondary literature suggests that these plants were quite similar to each other. In a previously cited article in *Civil Engineering*, a PG&E engineer noted the similarities of four major steam plants that were under construction in 1950, just before work at the El Segundo plant started. The article emphasizes economical measures that were taken to hold down costs on these enormously expensive projects and hints at cooperation between the PG&E and SCE, both of which were faced with the same types of problems. For example, the saltwater intake at the PG&E Moss Landing plant was patterned after an intake already under construction by SCE at its Redondo Beach plant.[48]

There are few secondary analyses of the steam plant expansion of the SCE, compared with those treating the expansion of PG&E. Technical information from SCE annual reports and construction journals, however, indicate that the design of the El Segundo Generating Station was typical of SCE plants from the period. The most common element among the SCE plants of this period is the exposed steel frame for the boiler. This design is so characteristic that these plants appear to be identical, even though they often include different sizes of boilers and generators.

The El Segundo Generating Station also utilized equipment that was essentially "off-the-shelf," that was ordered in large numbers, and that was installed throughout the SCE system. As discussed earlier, it was a substantial project, but was by no means the largest steam station

[47] Williams, *Energy and the Making of Modern California*, 374.

[48] Steele, "Steam Power Gains on Hydro in California," 21.

constructed in Southern California during the post-war era. It does not appear that the station represented a new departure in the technology of steam generation of electrical power. Neither does it appear that the plant represented any type of departure in the areas of plant siting, foundation work, or any other aspect of power plant construction techniques. The station, therefore, does not appear to meet Criterion C, because it does not embody the distinctive characteristics of a type, period, or method of construction.

Neither does the power plant appear to be associated with the life of a historically significant person (Criterion B), nor is it significant under Criterion D, which addresses the "information potential" of a property. In rare instances, buildings and structures can serve as sources of important information about historic construction materials or technologies under Criterion D; however, this property is otherwise well documented and does not appear to be a principal source of important information in this regard.

If a property meets any of the significance criteria, it is then evaluated for its degree of historical integrity. In this case, the station does not appear to meet any of the significance criteria, rendering the status of its physical integrity irrelevant. Despite the fact that the plant appears to largely retain integrity to its original design, the station lacks overall historic significance.

In summary, the El Segundo Generating Station does not appear to represent an exceptionally significant property, whether considered within the context of the history of the Southern California Edison Company, the history of steam electrical generation, or the more limited context of steam plants built by SCE during the post-war era. Its dominant characteristic is its typicality rather than its exceptionality.

6. CONCLUSION

JRP Historical Consulting Services has prepared this report to evaluate whether The El Segundo Generating Station appears to be eligible for listing on the National Register of Historic Places or the California Register of Historical Resources. The purpose of this document is to comply with applicable sections of the National Historic Preservation Act and the implementing regulations of the Advisory Council on Historic Preservation as these pertain to federally-funded undertakings and their impacts on historic properties. The report also seeks to comply with California Environmental Quality Act (CEQA) guidelines by evaluating properties in accordance with Section 15064.5(a)(z)-(3), using the criteria outlined in Section 5024.1 of the California Public Resources Code. The El Segundo Generating Station does not appear to meet the criteria for listing in the National Register, nor is it an important historic property under applicable guidelines of CEQA.

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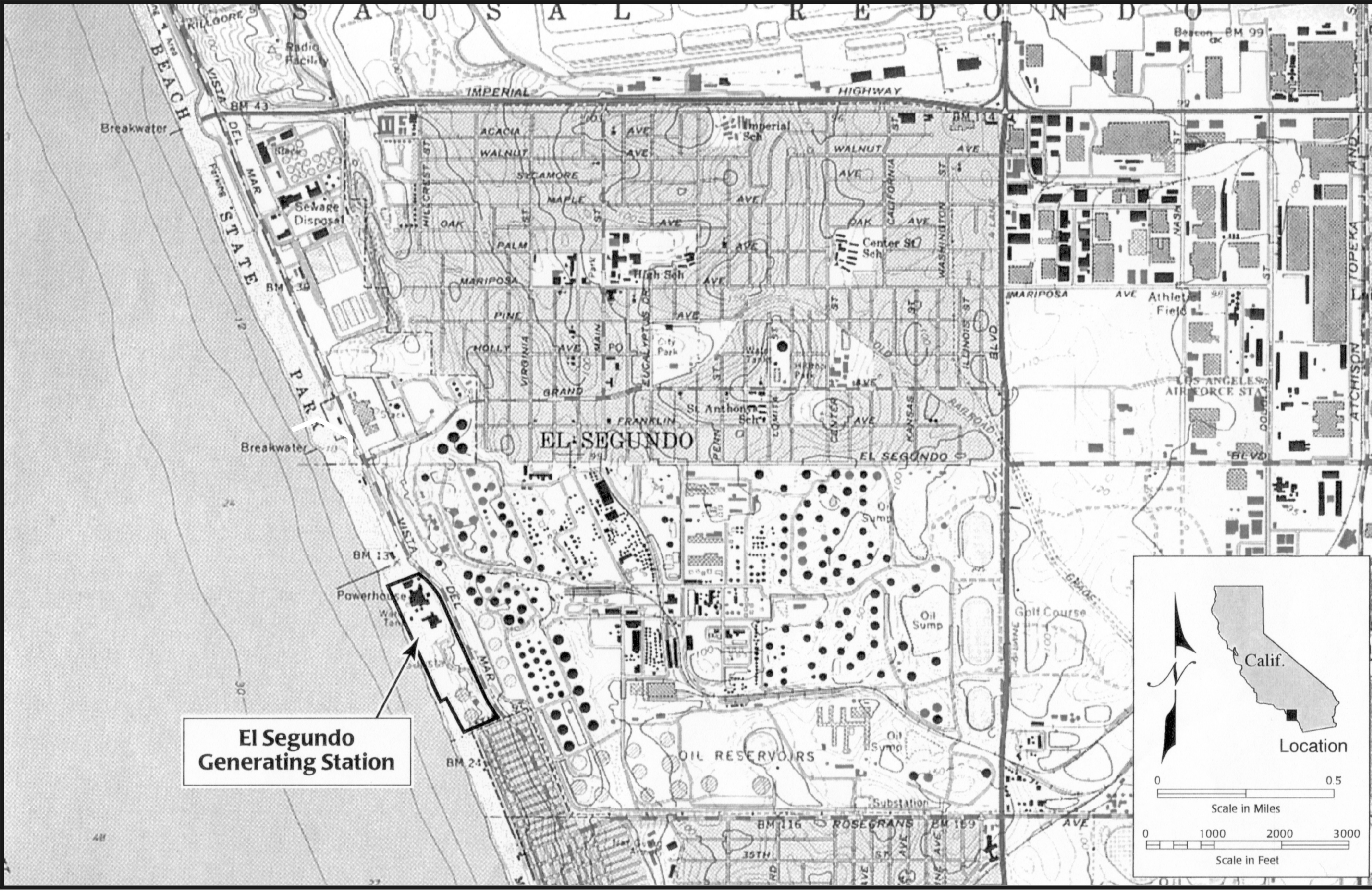

As taken from “NRG Energy, Inc. Area Map, El Segundo Generating Station Repower Project”

Figure 1: Project Location and Vicinity, El Segundo Generating Station
Base Map: USGS Topographic Quadrangle Venice, CA (Photoinspected 1981)

As taken from "NRG Energy, Inc. Aerial View, El Segundo Generating Station Repower Project"

Figure 2: Area of Potential Effects, El Segundo Generating Station
Source: Landiscor Aerial Information

Photo 1. El Segundo Units No. 1 and 2, camera facing northwest. Administration building visible at lower right, one of the fire hose sheds visible at lower left.

Photo 2. Units No. 1 and 2.

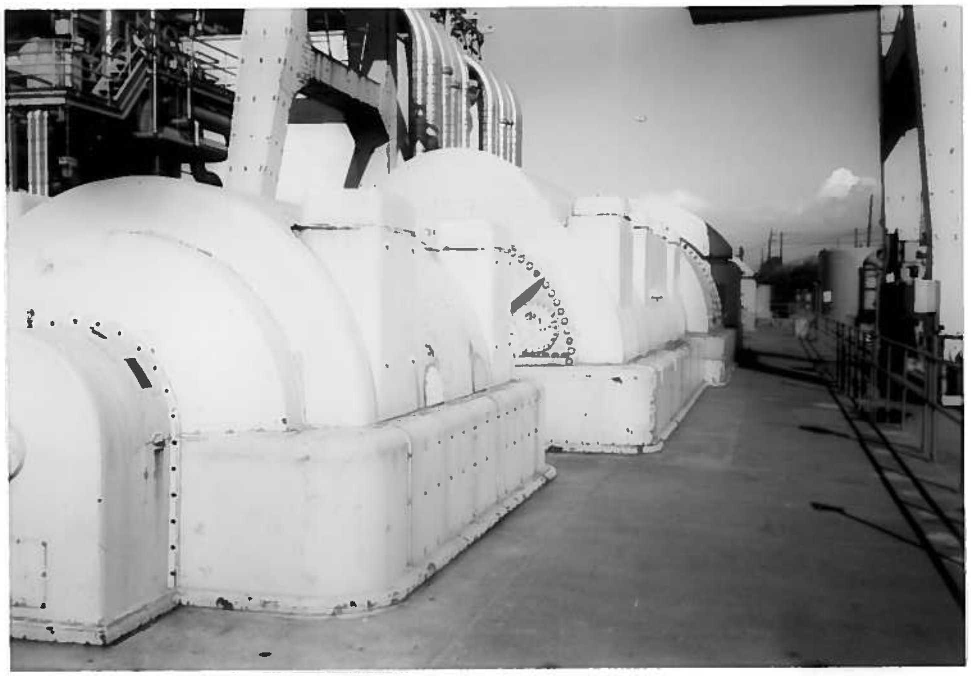

Photo 3. Generators (Units No. 1 and 2), from operating deck.

Photo 4. Distilled water supply tanks, Units No. 1 and 2.

Photo 5. West elevation of auxiliary bay, Units No. 1 and 2.

Photo 6. Screenwell structure of seawater intake system for Units No. 1 and 2 in foreground. Screenwell control house just left of center, with seawall visible to rear.

Photo 7. El Segundo Unit No. 3.

Photo 8. El Segundo Units No. 3 and 4. Urea tanks visible at left.

Photo 9. Boiler stacks, Units No. 3 and 4.

Photo 10. Generator for Unit No. 3, from operating deck catwalk.

Photo 11. Gantry crane, Units No. 3 and 4.

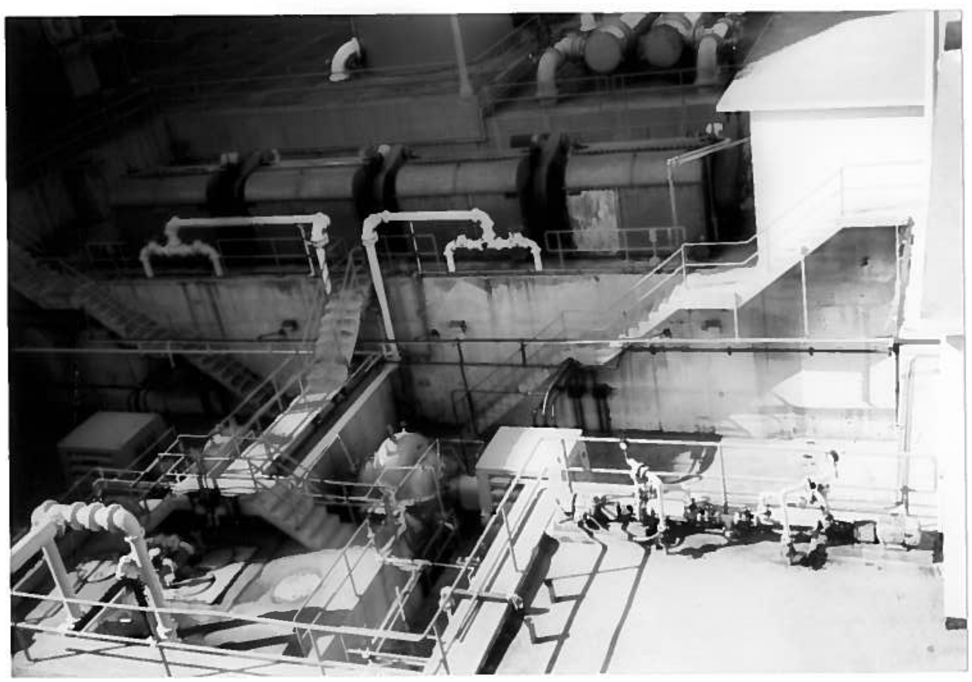

Photo 12. Seawater intake structure for Units No. 3 and 4, control house partially visible at upper right.

Photo 13. Fuel oil storage tanks, camera facing east.

Photo 14. Cutter tank located just east of fuel oil tanks.

Photo 15. Administration Building, camera facing north.

Photo 16. Warehouse portion of Warehouse/Shop Building, south elevation.

Photo 17. Instrument Shop at center rear, seawater intake and control house (Units No. 3 and 4) in foreground. Distilled water tanks for Units No. 3 and 4 at right, and hydrochloride storage building at lower right.

Photo 18. Fire equipment house, degreaser, sand blast facility, camera facing north.

Photo 19. Guardhouse, camera facing east.

Photo 20. Urea tanks, camera facing southwest. Fire hose shed visible at lower left.

Photo 21. Service water tank, camera facing northeast.

Photo 22. Long vehicle shelter located west of Units No. 3 and 4.

Photo 23. Dimineralization Building, camera facing southeast. Switchyard partially visible at top.

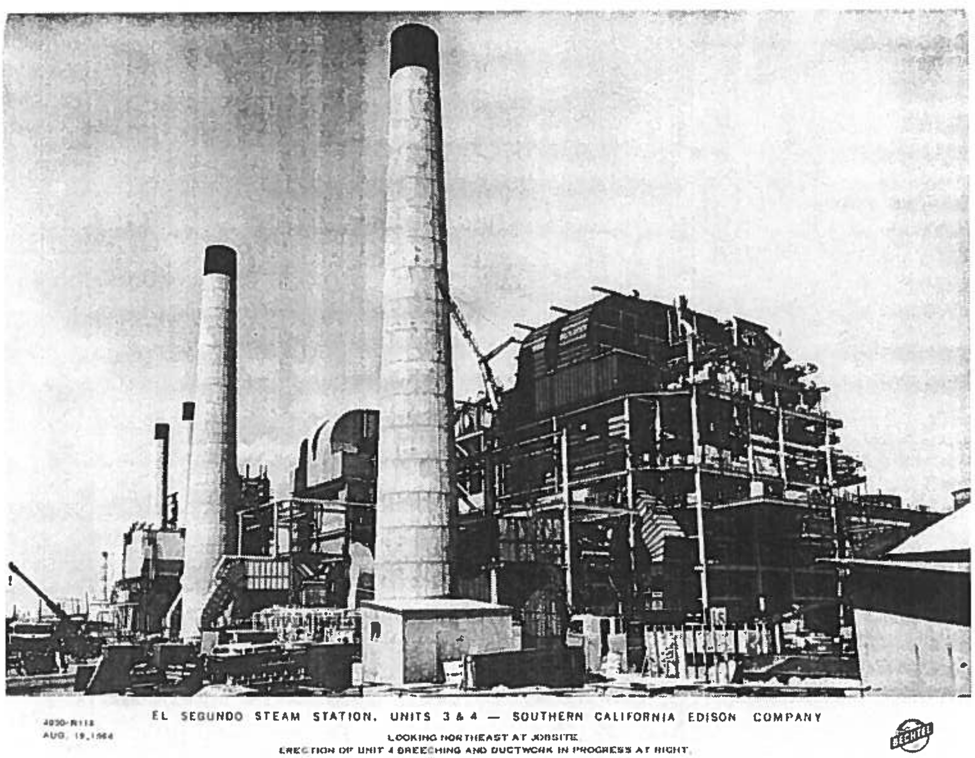

Photo 24. El Segundo Generating Station during construction of Units No. 3 and 4 in 1964.