APPENDIX 8.3-B

Previous Comprehensive Cultural Resource Assessment of the Chevron Richmond Refinery

S-12270

LSA

TECHNICAL APPENDIX
CULTURAL RESOURCES ASSESSMENT
CHEVRON MODERNIZATION PROJECT

PREPARED FOR

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INTRODUCTION

This report presents the results and findings of a cultural resource/ scientific literature review and limited survey of the proposed modernization project for the Chevron refinery in Point Richmond, California. Figure 1 shows the regional location of the project area.

This cultural resource assessment contains three sections: 1) research of archival sources, 2) in-field reconnaissance, and 3) statement of impacts and recommendations. The purpose of the archival search and the in-field reconnaissance is to identify potentially significant cultural resources on or near the project area, and to relate their locations to that of the proposed development. The statement of recommendations outlines options to preserve or mitigate impacts to any cultural resources.

This report follows the guidelines established by the California State Historic Preservation Office, the Society for California Archaeology (King, Moratto, and Leonard 1973) and the Society for American Archaeology (McGimsey and Davis 1977). It constitutes compliance with the California Environmental Quality Act of 1970 (CEQA), as well as the California Energy Commission requirements for Application for Certification filing.

Beth Padon, staff archaeologist with LSA Associates Inc. (LSA), served as Principal Investigator for this cultural resource investigation. Jason Marmor served as Project Historian and Rebecca Conard, Ph.D., assisted LSA by reviewing the historical assessments. Dr. Jane Rosenthal prepared the cultural history for the report, while Pat Jertberg conducted the archival research and prepared this section of the report. Scott Crownover, M.A., prepared the ethnographic portion of the report. Fran Govean, Ph.D., conducted and prepared the paleontological review. Resumes are available upon request. Appendix A contains the paleontological report.

ARCHIVAL RESEARCH

Archaeological Records Review

On March 15, 1990, Patricia Jertberg of LSA conducted an archival review of current archaeological reports, records and site maps for the Chevron AFC project at Sonoma State University, the State designated clearing house for Contra Costa County. The objective of the archival review is to determine the potential for the presence of intact archaeological deposits, or historical structures within the project area. Sources consulted included current archae-

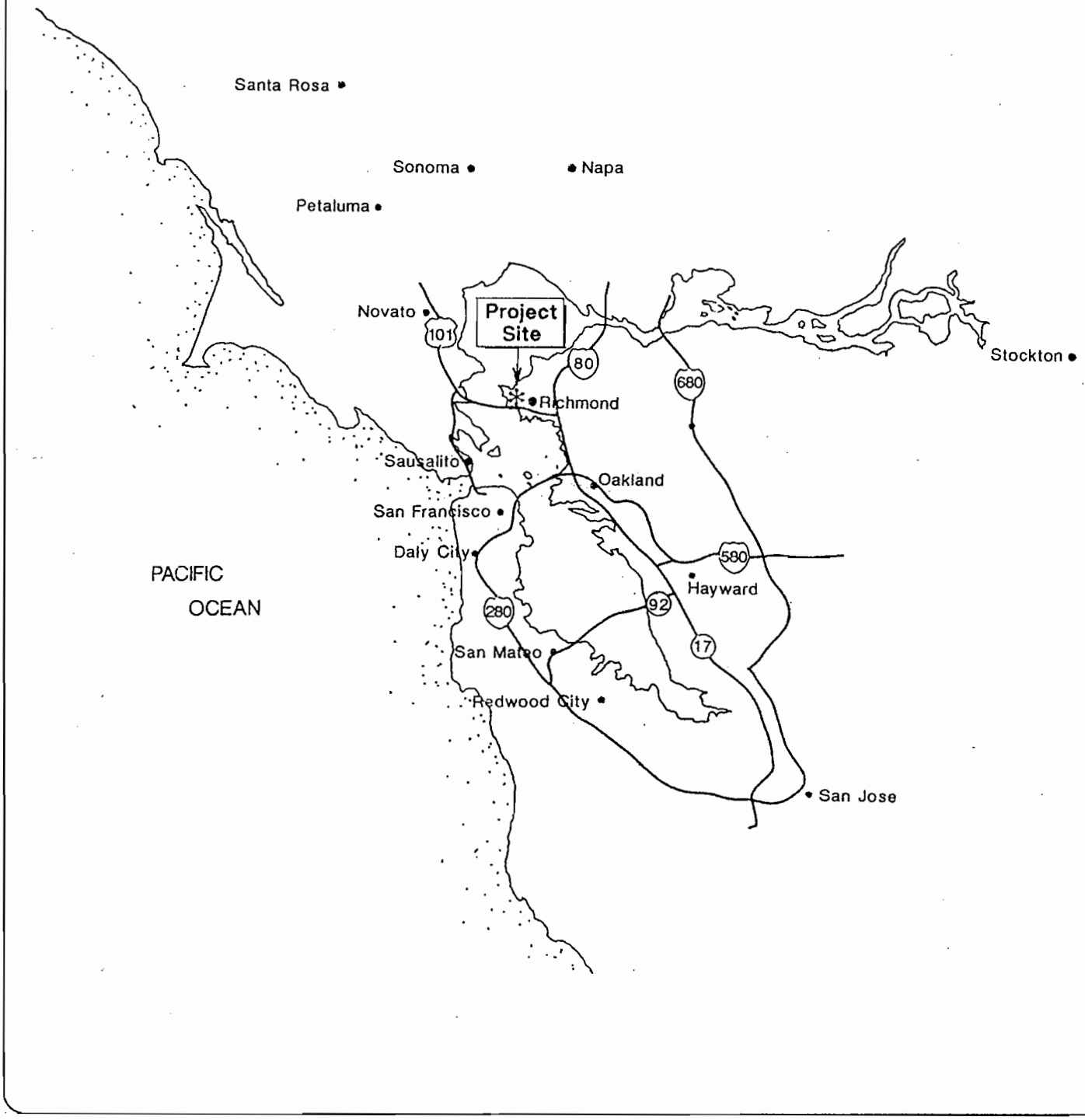

FIGURE 1

SCALE IN MILES

0 15

REGIONAL LOCATION

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ological site and survey maps, old edition USGS maps, national, State and local directories for historic resources, and pertinent archaeological site records and survey reports.

The following comprise a detailed listing of the sources consulted in this effort:

- USGS *Richmond* 7.5′ quadrangle, photorevised 1980
- USGS *San Quentin* 7.5′ quadrangle, photorevised 1980
- Geologic Map of the Mare Island Quadrangle, nd.
- USGS *San Francisco* Quadrangle, 1942
- USGS *Napa* Quadrangle, 1902
- Archaeological site records for CA-CCo-276, -277, -278, -279, -280, -281, -282, -283, -284, -285, -422H, -436, and -506H
- *National Register of Historic Places*
- *California Historical Landmarks*
- *Points of Historical Interest*
- *California Inventory of Historic Resources*

Eight archaeological surveys have been conducted within the geographical area of Portero San Pablo, bounded on the southeast by Garrard Boulevard, San Francisco Bay on the west and north and Castro Creek on the northeast. This area is approximately five by six kilometers and includes the Chevron USA Richmond refinery and surrounding area. Most of the surveys were the result of linear projects or small discrete locations. The most relevant and comprehensive survey report was conducted by California Archaeological Consultants, Inc. (CAC) in 1986 for Chevron USA, Inc., Richmond Refinery Deep Water Outfall Project. During the CAC project, no new archaeological site locations were recorded; however, site records were summarized and updated based on archival and field reviews. Since the development of the Portero San Pablo into an industrial and transportation center for the San Francisco Bay region predates the enactment of the California Environmental Quality Act (CEQA) and its mandates for archaeological assessments, the refinery and surrounding area has not been systematically surveyed. The numerous archaeological sites located on the Portero San Pablo were recorded in the early 1900s as a result of independent efforts or university research projects.

The survey reports and literature indicate that sites within and surrounding the project area are primarily described as shellmounds or shell heaps. These prehistoric shellmounds/shell heaps are a few of the over 400 such sites in the San Francisco Bay region and represent an occupation period of several thousand years (Hoover, Rensch and Rensch 1966). Two of the largest, Emeryville in Alameda County and Ellis Landing in Contra Costa County,

were excavated by the University of California, Berkeley from 1906 to 1908. As reported by N. C. Nelson, the mounds contained stone and bone tools, house pits, shell and bone ornaments, skeletal remains, and abundant shell, mostly clam and mussel (ibid 1966). It is apparent from the data recovered that these sites were utilized as both residential bases and burial sites. Natural and modern forces, such as weather, erosion, tides, urbanization and industrialization, have substantially impacted these archaeological resources since their prehistoric occupation. However, in spite of the passage of time and encroachment by the modern world, often a portion of these sites remains intact.

A total of 15 sites is recorded on the San Pablo peninsula within the area delineated above. Two of the three recorded historic sites are listed on the *National Register of Historic Places*: 1) Point Richmond Historic District, and 2) Winehaven. The third is the recorded location of the Chinese Shrimp Camp, but it carries no other landmark designation. The remaining 12 sites on the peninsula are recorded prehistoric sites. All but one, CA-CCo-436 (recorded by R. G. Stephens 1922), are shellmounds or shell heaps recorded by N. C. Nelson in the early 1900s. Five of these prehistoric sites (CA-CCo-277, -278, -281, -284, -436) are within areas of potential direct or indirect impact as a result of the Chevron refinery modernization project (Table A). Direct impact means the resource would be impacted by the project. Indirect impact means the resource is located near enough to the proposed project that it could be directly affected.

Historical Archival Research

Additional research was carried out by Jason Marmor, LSA Staff Historian, to gather historical data necessary to provide a context for understanding and evaluating potential historic resources. This research effort included a review of secondary sources, historical maps and photographs pertinent to the project area at several repositories, including the City of Richmond Library, the Whittier Public Library, and the University of California, Irvine, Research Library. Among the sources consulted, Mr. Gerald T. White's corporate history of the Standard Oil Company of California provided pertinent information about the establishment and early years of the Richmond refinery.

TABLE A
ARCHAEOLOGICAL SITES WITHIN 400 FEET OF DIRECT IMPACT LOCATIONS
CA-CCO-277, -278, -281, -284, -436

Site Number	Recorded/Reviewed By	Date	Description	Condition
CA-CCo-277	N.C. Nelson	1907	Shellheap	Insignificant
CA-CCo-277	R.I. Orlins	1986	Developed; refinery	Inaccessible; possibly destroyed
CA-CCo-278	N.C. Nelson	1907	Shellheap	Eroding
CA-CCo-278	R.I. Orlins	1986	Fill materials present	No evidence found
CA-CCo-281	N.C. Nelson	1907	Shellmound with mortar fragments	RR track cut through; eroding
CA-CCo-281	R.I. Orlins	1986	Does not appear to be updated	No information available
CA-CCo-284	N.C. Nelson	1907	Shellheap	Main road crosses site; office on site; oval contour visible
CA-CCo-284	Bennyhoff	1952	Occupation and burial site	RR track over site; road and pipe line; leveled for garden; wave cut on edge
CA-CCo-436	R. G. Stephens (#4)	1922	Contained many artifacts	No information available
CA-CCo-436	P. Banks	nd	No description	Not possible to field check
CA-CCo-436	R.I. Orlins	1986	No description	No field check; under several feet of fill

ARCHAEOLOGICAL OVERVIEW

History of Archaeological Research

Since the 19th century, scholars have recognized that the San Francisco Bay region was densely occupied aboriginally and, therefore, had numerous archaeological sites. Unfortunately, expanding urbanism destroyed many archaeological sites before they could be recorded, much less researched, and as a result the archaeological records of the Bay area generally, and the East Bay area specifically, are not well understood.

The history of archaeological research around San Francisco Bay is the history of the foundations of American archaeology. The pioneer American archaeologist Max Uhle used stratigraphic methods for the first time during excavations at the Emeryville shellmound (CA-Ala-309) by the University of California, Berkeley (Willey and Sabloff 1974: 74). In 1902, Uhle systematically trenched and tunneled through this large shell midden near Berkeley. Using stratigraphic principles, he recognized two major occupational components containing five strata each. He noted changing *Ostrea* and *Macoma* species frequencies within the midden. Uhle considered the occurrence of *Haliotis* ornaments and saw like tools, as well as both inhumation and cremation (1907: 22-30, 38) within different strata, as significant. He interpreted these data as indicating both a long period of occupation, as well as a nearly historic habitation. Uhle concluded:

> "Thus, while the history of the shellmounds of this region probably reaches back more than a thousand years into the past, it must have extended almost to the threshold of modern times" (1907: 36).

Spurred by Uhle's research and supported by Mrs. Phoebe A. Hearst, the Department of Anthropology, University of California, Berkeley, continued investigations around the San Francisco Bay for six years. An intensive survey to locate archaeological sites was begun in 1906. Nels C. Nelson surveyed coastal locales from the Russian River to Half Moon Bay. Between 1906 and 1908, Nelson documented 425 earth mounds and shell heaps, including several within and surrounding the current project area (Nelson 1909; Moratto 1984: 227). By 1906, he was excavating the largest of the recorded shell middens, located at Ellis Landing just slightly southeast of Point Richmond (Nelson 1910). His shellmound research still constitutes the major data base for coastal settlements in the Bay area. The research also represents the first serious attempt to explain settlement patterns in American archaeological literature (Willey and Sabloff 1974: 64). Nelson argued that recognizing the long-term utilization of coastal and Bay shellfish was the key to understanding

prehistoric native Californian coastal cultures. The artifacts recovered from the Ellis Island excavation formed the basis for the first regional chronology (Moratto 1984: 227).

Along the shores of Alameda and Contra Costa counties, Nelson documented many large shellmound sites. During his landmark survey, he located 11 sites within a two mile radius of the current project area, and five within the present refinery boundary. At least one site recorded by Nelson (CA-CCo-279) still exists (Orlins 1986). Unfortunately, much of Nelson's work remains as unpublished manuscripts in the Lowie Museum, University of California, Berkeley.

During the decades following Uhle's and Nelson's work, only sporadic research was conducted in the East Bay (Beardsley 1948: 1). After 1958, there was a modest increase in regional research (Elsasser 1978: 37). With the enactment of the California Environmental Quality Act, surveys and site reevaluation, as well as inland research, began to complement the coastal data collected by Nelson and Uhle. Still, the paucity of systematic site excavation makes any remaining archaeological resources of considerable significance.

Regional Cultural History and Chronology

The San Francisco Bay was, until fairly recently, especially rich in waterfowl, fish and mollusks; hence, Nelson's documentation of an intensive prehistoric occupation was not unexpected. The limiting factors for aboriginal habitation in the Bay area were always fresh water, wood and dry land. Even when these resources were apparently absent, major campsites could still be found. Nelson indicated, when writing about the Richmond area over 80 years ago:

> "There is one exception to this generalization in the case of the mounds on or near the Portrero Hills in the vicinity of Richmond: for here, at the present time at least, both water and wood are practically absent. It may be assumed, however, that recent changes have removed these necessities or else that an extraordinary abundance of shell fish was the compensating element." (1909: 331).

San Francisco Bay itself is of recent geologic origin, having been created when marine waters invaded the land some 8,000 years ago. Researchers suggest regional aboriginal adaptation must have appeared and developed since the Bay's establishment (circa 6000 B.C.). If earlier occupations existed, the archaeological remains are no doubt deeply buried under Holocene and recent sediments (Bickel 1976).

Bay and coast chronologies begin around 5000 B.C. By 2000 B.C., the archaeological record is documented by a dozen radiocarbon dates (Moratto 1984: 277, Elsasser 1978: 37). Regional site information suggests the Bay was sporadically visited by hunter-gatherers using foraging subsistence strategies involving moderate mobility and seasonal visits to specific plant or animal resources (Moratto ibid). The resulting sparse archaeological record represents the Early Horizon of Central California's manifestation of the Archaic Stage of North American prehistory (Beardsley 1948; Frederickson 1974). Central California has a tripartite chronology (Early, Middle and Late), which begins in the Archaic Stage and continues until the Historic Stage (Beardsley 1948).

Moratto (1984: 277-278) suggests that, after 2000 B.C., settlement numbers and population grew as many more sites exist. This increased archaeological visibility represents a new adaptation to marshlands and Bay shore habitats. Sites like Nelson's Ellis Landing (the lower levels) are expressions of this more intensive, more sedentary, coastal adaptation. At Ellis Landing, the deposits document first shellfish collecting, then increased use of all marine and terrestrial fauna. Mortars and pestles, *Olivella* shell beads and flexed inhumations, as well as serrated bone implements, antler wedges and distinctive hammerstone were present. House pits and burials suggest a semi-sedentary population inhabited the site, and the presence of tools for basketry, weaving and fishing clearly indicate technological specialization was occurring (Nelson 1910: 401).

Both Moratto (1984: 279) and King (1974) argue that this adaptation represents the initial spreading of Utian (a language family of Penutian stock which includes both Costanoan and Miwok subfamilies) speakers from the Delta area toward the Bay and coast. Frederickson (1974a) has recognized this special cultural adaptation as the "Berkeley Pattern." He places it, temporally, in the Early Horizon of Central Californian prehistory, while Moratto (1984) extends the pattern into the Middle Horizon. King notes that early "Berkeley Pattern" sites around the Bay are located where multiple resource zones, oak woodland, chaparral, grassland, rocky shore, marsh and mudflat may be readily used. The pattern has some specific features and typical artifacts within each "district" (our project area is within the Alameda District).

Representing the Berkeley Pattern within the Alameda District is not only Ellis Landing, but also the lower strata at the Emeryville shellmound. Here, characteristics first observed at Ellis Landing continue, but new tools and ornaments also appear. Mortar and pestles are quite common, as are grooved stone "sinkers" (Uhle 1907: 43-84). Bone tools such as awls and needles occur more frequently here than at Ellis Island. Burial customs include placing

simple grave goods (sometimes whole birds or mammals) around flexed inhumations. Apparently, coastal products were augmented and the subsistence base enhanced by acorn meal processing and storing. Frederickson indicates the Berkeley Pattern represents the introduction of the acorn as an economic staple throughout Central California.

Around 400 B.C., a slow cultural evolution begins. A newly emerging pattern, the Patterson, is found in the Alameda District. It has been placed within the traditional Middle Horizon by Elsasser (1978: 38); however, Moratto (1984: 281) includes both the Berkeley and Patterson as Middle Horizon, and does not discuss the latter as a significant cultural adaptation. Some confusion exists concerning how ongoing coastal developments correlate with the Central California Horizons, as local patterns represent adaptations over time rather than temporal constructs (Moratto 1984: 261).

The chronological confusion apparent in regional syntheses partly results from the long recognized continuity in coastal adaptation, which was implied by Kroeber as early as 1925 (466). Core economic activities remain virtually unchanged from about 2000 B.C. until Spanish contact. Some distinctive and innovative artifact types do, however, become prevalent. The Emeryville shellmound's upper strata typify the archaeological situation. They reveal a gradual environmental change; shell species typically collected from rocky or gravelly bottom (*Ostrea* and *Mytilus*) areas are replaced by mudflat area (*Macoma*) taxa. Accompanying this slow procurement shift are steadily increasing frequencies of elaborate bone tools and ornaments. Inhumations with red ochre pigment are also common, and differ from the previous simple burials. Although these changes are, overall, so gradual that Kroeber argued against Uhle's interpretation of Emeryville stratigraphy as multi-component because he thought evolutionary change was not present (Willey and Sabloff 1974: 64).

By A.D. 300-500, the cultural patterns present at Spanish contact begin appearing. Frederickson terms the last prehistoric the "Augustine Pattern," while other researchers maintain that Costanoan or Late Horizon is the proper appellation for the recent prehistoric period. Aside from the strong ethnohistoric connections, the major distinctions found archaeologically are tool differences between the Delta and Bay regions, and the dispersion of Bay populations. Wooden mortars and pestles, as well as concentrated villages, are more common in the Delta than the Bay region.

Localized facies have been recognized such as the Fernandez, Emeryville and Newark; however, the rationale for proposing these is unclear. What is clear is that artifacts such as the bow and arrow, bone harpoon and the tubular steatite tobacco pipe occur for the first time throughout the region. These

introductions are attributed to a veneer of "northern influences" imposed upon but not radically affecting the local Utian peoples (Moratto 1984: 283). Shell artifacts play an important role in isolating change and facies in the Late Horizon. Many new and elaborate bead and *Haliotis* pendant forms develop.

Our picture of prehistoric Costanoan settlement is cloudy because, as Moratto points out (ibid: 267), since Nelson's era, extensive excavations at Late Horizon sites have not occurred. Overall population numbers increase in the Late Horizon; however, in the Bay area, for unknown reasons, large settlements are replaced by greater numbers of small settlements. These settlements show increasing reliance upon plant foods, particularly acorns, and regional trade for products like obsidian is also important. Still, the economic core of mixed marine and terrestrial resource use remains (Bickel 1976).

Many cultural traits herald the activities observed at Spanish contact. Shamanism and ritual cult activity are prominent cultural features if charm stones and other esoteric artifacts can be interpreted by ethnographic analogy. Trade items often appear in burials, and clamshell disk beads are used as exchange media. Burials reflect status differences (both ritual and economic) and there is pre-interment burning of grave goods; red ochre use diminishes. All these cultural attributes, settlement dispersion, mixed subsistence strategies dominated by acorn use, social stratification, elaborate ritual and highly developed exchange systems, were in place when Manuel de Ayala first sailed into San Francisco Bay and encountered native Californians in 1775.

ETHNOGRAPHIC OVERVIEW

The shores of tidal flats surrounding San Pablo Bay and the Portero-San Pablo Ridge lie within what was once the territory of the Chochenyo speaking Xucyun tribelet of Costanoan Indians. This is one of several groups ancestral to the modern day Ohlone Tribe which was incorporated in 1971. The term Costanoan is a linguistic subfamily, and serves to distinguish the coastal dwelling members of the broader Penutian language family from the remainder of this linguistic group which occupied the bulk of the watershed of the Sacramento and San Joaquin Rivers. Other members of the Penutian linguistic group include the Maidu, Wintun, Yokut and Miwok.

Chochenyo was one of seven languages spoken among the Costanoan peoples, its distribution encompassing the eastern shore of San Francisco Bay between Richmond and the Mission San Jose (Levy 1978: 485). Specific information regarding the individual Chochenyo speaking tribelets is very limited. The Chochenyo village of Huime-n, located several miles inland from Point San

Pablo, may have been one of the villages of the Xucyun tribelet (Kroeber 1925: 465).

Ethnographic data on the Costanoan ethnic groups are based primarily on accounts of early Spanish explorers such as Sebastian Vizcaino, who landed in Monterey in 1602, and on the mission records following the founding of seven missions in the San Francisco Bay area between 1770 and 1797 (Levy 1978: 486). The rapid and forceful acculturation and desocialization imposed on the Costanoan people by the mission friars left very little of the native rituals, customs and lifeways of these people. By 1810, all of the Costanoan groups had been forced to abandon their aboriginal subsistence pattern and move to the missions. Exposure to European disease and the declining birth rate among the converted Indians caused the population to be decimated. By 1935, all use of the Costanoan languages is believed to have ceased (ibid: 487).

In addition to tribal divisions, the Costanoans were organized into clans and moieties. The basic kin group was the patrilineal extended family. Kinship terminology may indicate that cross cousin marriages were observed. Chiefs, village speakers and shamans provided leadership within the villages. Village chiefs organized ceremonial activities, subsistence and warfare. Feuds between tribelets and territorial disputes between the Chochenyo and neighboring groups prompted frequent raids.

Costanoan religious observances included prayer offerings of beads or tobacco to the sun. Chochenyo groups also used shell beads to appease a spirit that inhabited a whirlpool in San Francisco Bay (ibid: 489). Objects sacred to the Costanoans included the sun, large redwood trees and the Pajaro River (Kroeber 1978: 471). Shamans directed the performance of ritual dances to ensure an abundance of fish, game and acorns. Other religious practices include avoidance of the names of the dead and cremation. Facial tatoos consisting of rows of dots adorned the faces of female Costanoans.

The Costanoan's subsistence practices centered around gathering of shellfish and salmon, steelhead fishing, as well as seed and acorn gathering. Mussels are the predominant mollusk found in the shell midden sites in this area. The Chochenyo groups are said to have employed dip nets and tule rafts for catching fish and lampreys (Levy 1978: 492). Hunting of large and small mammals contributed meat to the diet. Hunters used sinew backed bows and cane shaft arrows to pursue game. Hardwood foreshafts, either alone or tipped with points of locally available chert, bone or imported obsidian, were fastened to the end of the cane arrows. Large game included deer, elk, bear, sea lions and occasionally stranded whales. Smaller game pursued included dogs, squirrels, woodrats, moles and a variety of waterfowl. In addition to meat, the game

provided leather and pelts for cordage and clothing. The Chochenyo used fox pelts for making arrow quivers.

A variety of plant resources were included in the diet. The Costanoan's gathered seeds from dock, chia and tarweed. Nuts were obtained from buckeye, hazelnut trees, holly leafed cherry and digger pine. Roots and tubers from the wild onion, cattail, amole, and wild carrot were dug. Fresh blackberries, elderberries, strawberries, gooseberries and wild grapes were available when in season. The Costanoans made beverages from the berries of manzanita, toyon, and madrone (Levy 1978: 491).

Costanoan houses consisted of a dome shaped wood frame thatched with tule reeds. In addition to family houses, special dance structures and large assembly houses of similar construction are reported. Females wore aprons of hide and tule reeds. Males shunned clothing in all but the coldest weather, sometimes applying a layer of mud as insulation. Females made baskets of twined manufacture for carrying, storage and cooking containers, as well as specialized implements for seed beating, winnowing, and hoppers for large mortars. A variety of sedimentary and metavolcanic stones were ground to shape to serve as net weights, milling tools, anchors and pipes. Costanoans traded with the Miwok and Yokuts, obtaining pine nuts, clamshell disk beads, and probably obsidian for bows, *Olivella* shells, salt, mussels and abalone (ibid: 488, Collier 1983: 15).

HISTORICAL OVERVIEW

The history of the Chevron Richmond refinery is one of continual change. A key player in the dramatic California oil industry, the Richmond refinery was founded when the petroleum refining industry was in its infancy at the dawn of the 20th century. The refining industry has evolved in response to numerous powerful stimuli: the changeover from coal to fuel oil in trains, ships, and factories; the development of transportation utilizing the internal combustion engine; population growth in the West; two world wars; and innovation in the application of chemistry, technology, and engineering to the treatment of crude oils. Originally, the refinery was established by the Pacific Coast Oil Company (PCO), later merging with the Standard Oil Company, and ultimately a part of Chevron USA. The refinery's physical layout changed rapidly and frequently to accommodate the changing external conditions.

The Chevron USA. Richmond refinery had its roots in the Pacific Coast Oil Company, which was formed in 1879 in California by a group of men headed by D.G. Scofield. PCO's first refinery, a primitive three still affair on the outskirts of Newhall in Southern California, proved to be both too small and

too far from the centers of trade. In 1880, a larger facility was erected at Alameda Point on San Francisco Bay (Whitnah 1944: 35). The Alameda refinery, operating nine stills producing a range of products including illuminating and lubricating oils, gasoline, benzine and naphtha, was the State's major refinery until the establishment of the Richmond facility a little over two decades later.

In 1890, the Pacific Coast Oil Company (PCO.) became affiliated with the Standard Oil Company of Iowa, which was seeking to expand its market to the west coast. Standard had opened sales offices in the Pacific Coast states, but had no refining facilities in the region. The terms of the new agreement initiated a relationship whereby Standard Oil would market the refined products produced by PCO. (ibid). In 1900, Standard Oil purchased the entire stock of the Pacific Coast Oil Company.

Immediately after the buyout, Standard embarked on a bold program of expansion in the west. The PCO. name was retained until formal consolidation of the Standard Oil Company occurred in July of 1906. Taking advantage of the prolific production of new oil fields in the lower San Joaquin Valley, particularly in the Kern River field near Bakersfield, PCO. developed ambitious plans for a pipeline to carry the crude to the San Francisco Bay area. To handle the large quantities of oil, a huge new refinery was proposed for the northern terminus of the line (White 1962: 219-220). Among Standard's goals in the west was the cultivation of new markets in the Pacific, including Hawaii, the Philippines and Asia (ibid: 221).

In the summer of 1901, William Rheem, Standard's Alameda refinery superintendent, sought a new site for the refinery and pipeline terminal. The Alameda site consisted of a mere eight acres, and the adjoining land was prohibitively expensive. Further, the Bay at Alameda was too shallow for sizeable ocean going vessels. Three potential refinery sites were considered, two of which were located on Suisin Bay, and the other a mile north of the new Santa Fe Railroad marine terminal at Point Richmond. The latter location was selected and, on September 14, 1901, Pacific Coast Oil purchased 118 acres of tidelands and hills for the sum of $15,000 (ibid: 245). At the time of the sale, the refinery site was the headquarters of a dairy operation (Griffins 1938, in Havlik 1984: 18). Soon after the initial purchase, additional land was acquired, bringing the total acreage to 149.

No time was wasted in planning for the new facility, which was to have two major functions: refining and shipping. In late October of 1901, Rheem and his assistants occupied the vacant tenant's cottage on the property and commenced direction of the construction work. The marsh between the site on

the point San Pablo peninsula and the mainland was filled, and a railroad spur laid across it. The spur formed the main axis of the refinery. The refining equipment would be placed south of the tracks; to the north would go the buildings, and the storage tanks would be located on the hills behind them. A gap in the hills east of the refinery opened onto San Francisco Bay, where a deep water wharf was to be built. When drilling failed to provide an adequate fresh water supply for cooling, a saltwater pumping station was built near the wharf (White 1962: 246).

Although hampered by heavy storms in the winter of 1901-02, the refinery was rapidly erected by an army of masons and other contractors (Whitnah 1944: 36). Extensive grading was required in advance of construction. Roads, building and tank sites were prepared, and before the close of the year construction was well under way. The original complex included a one story storehouse, a long one story combination boiler, machine and pipe shop building, a boiler house, ten 350 barrel tar stills (Battery 2), eight 1,000 barrel crude stills, a huge barrel house, acid recovery works, an office and a laboratory. Most of the specialized industrial equipment was ordered from the east, primarily from Standard's refinery at Whiting, Illinois (White 1962: 247). Virtually all of the buildings and still structures were made of bricks locally obtained from yards in San Rafael and Port Costa, which had to be brought across the bay in scow schooners and landed on the beach (Whitnah 1944: 37).

The first shipments of oil to Richmond came in June of 1902, via the PCO. tanker *Loomis* from Southern California; completion of the pipeline from Kern County oil fields was delayed by technical difficulties until mid-1903 (White 1962: 242). Despite these problems, the pipeline was considered a cheaper and more reliable means of transporting crude than by rail.

When completed, the Richmond refinery was by far the largest on the west coast. In its first year of operation, 3,317,000 barrels of oil were run through the stills; the daily output of the new facility was eight times as much as the old Alameda plant. In terms of the California industry, the Richmond refinery was also noteworthy in its capability for the production of highly refined products. Among the diverse array of refined products manufactured in the beginning, perhaps the most important was kerosine. This was made possible by the successful development of a new process to make an inexpensive, clean burning kerosine from California crude (White 1962: 250-251). This product, under the trade name "Petrolite," was soon to become the focus of a major new marketing effort in the Orient.

Almost as soon as the refinery went on line, it was modified and enlarged to meet the demands of the changing market and to incorporate new technological

processes. In 1903, a massive expansion program was implemented in order to double the refinery's production of kerosine. New facilities erected at the plant included seven 1,000 barrel stills added to Battery No. 1, a new battery of six 350 barrel "Kern crude" stills and the installation of two 600 barrel reducing stills for rerunning lube oil distillate to specifications (White 1962: 254). Of course, expansion of the refining structures necessitated expansion of the associated storage facilities as well. An acid plant was also added in 1904. In order to provide more space as the refinery expanded, 154 acres in San Pablo Canyon, approximately five miles away, were purchased, providing space for 40 storage tanks. Also, an additional 117 acres of land, including marshlands on the peninsula north of the refinery, were acquired for future needs (ibid: 255).

Further expansion occurred in 1905, when the number of 1,000 barrel stills in Battery No. 1 was increased from 15 to 20. The flow of crude oil supplies to the Richmond refinery was increased substantially by shipments from oil fields in Bakersfield, Colinga and Santa Maria, some of which was transported by tankers and barges from Ventura and Port Hartford (White 1962: 273). Differences in the constitution and quality of the oils from different localities required the installation of new equipment and the implementation of new refining processes.

In 1905, it was found that more shipping facilities were needed in order to move the increasing production of Petrolite to the Asian market. To remedy this deficiency, a new wharf was built at Point Orient, so named because of the intended use of the facility. Also built for this trade was a can and box factory to package the products for shipment. Unfortunately, losses due to leakage, poor quality materials and rough handling led to the decision to ship kerosine in bulk, and the Point Orient facilities were closed in 1908 (White 1962: 282-283).

In 1906, the trans-Pacific trade in Petrolite induced Standard officials to double the production capacity of the Richmond refinery. By the end of the year, $500,000 had been spent on a general expansion, which involved the conversion of all crude stills, except those making lube oil distillate, to continuous operation, construction of 15 more 1,000 barrel stills, and one more steam still to finish naphtha distillates. The expansion boosted production capacity to 28,000 barrels per day, making Richmond the third largest refinery in the Standard empire. The facility was able to supply almost all of the western states, as well as a major portion of the Oriental kerosine market (ibid: 284-285).

The disastrous earthquake of April 18, 1906, left San Francisco and neighboring cities in ruins, but caused little serious damage at the Richmond refinery. Several brick chimneys had fallen, a fire wall was shattered, several storage tank seams had split and a couple of wharf pipelines had been snapped (ibid: 276).

In the later years of the decade, Richmond took the lead among Standard's plants in the production of refined products including gasoline, the demand for which had been on the rise (ibid: 301-308, 310). The increasing demand for the motor fuel had reached such proportions that, by 1910, the construction of 15 new 1,000 barrel crude stills was authorized, at a cost of $225,000. This was the first substantial expansion of the refinery since 1906 (ibid: 383). In 1911, asphalt was added to the line of products immediately after the California Legislature voted an $18,000,000 appropriation for paved highways in the State (ibid). In the same year, Standard built another refinery seven miles north of Redondo Beach to handle the increasing volume of oil from Southern California fields, and to supply finished petroleum products to the growing urban areas of Los Angeles and San Diego (ibid: 463-465). The new plant was dubbed "El Segundo," Spanish for "the second" (ibid:464). At this time, the Standard Oil Company was responding also to growing competition for a leading share in the western American market.

The continuing increase in demand for automotive products was met by the Standard refinery with further physical modifications and chemical experimentation to expand the refinery's output. In 1912, two more reducing stills and additional treating equipment were built to increase production of lubricants. In the same year, to meet the demand for gasoline, 30 more crude stills were to be added to the 70 already in operation at the time, in order to raise production capacity to a daily rate of 60,000 barrels. Some of the new stills were intended to increase the output of Petrolite for the East. While this expansion was underway, Standard was receiving more oil than could be processed, and more storage facilities had to be built (ibid: 469). However, due to expansion at the El Segundo refinery in 1913, construction was halted on 15 of the 30 new stills authorized in 1912 (ibid: 472-473). In 1914, five 1,000 barrel crude stills were erected at Richmond to rerun lube oil distillate, bringing the total number of stills in operation to 90.

Late in 1915, experimentation began at Richmond to meet the ever rising demand for gasoline by "fractionating" and "cracking," whereby the long petroleum hydrocarbon molecules could be broken into the smaller molecular chains characteristic of the lighter refined products, including gasoline. Ten cracking stills were built at Richmond for gasoline refining, which employed an innovative process developed in 1913 by Dr. W.M. Burton at Standard's Whiting

refinery. However, it was found that the process was not well suited to the nature of California crudes. The gasoline cracked by the Burton process was expensive to produce, foul smelling, and the oil from which it was derived was high in carbon, resulting in excessive carbon deposition in the stills (ibid: 477). The latter problem proved so serious that in early 1919 all of the Burton process stills were shut down.

Towards the end of 1915, the increasing demand for lube oils led Standard Oil to the development of a new technology. Experimentation at the El Segundo refinery with the high vacuum distillation of crude for lube oil distillate was successful, and by the end of 1916 a battery of twenty-four 600 barrel vacuum stills was authorized for Richmond. The new process, which involved the vaporization of oil by being subjected to a near vacuum and the injection of steam, resulted in a threefold increase in production than from the earlier process. This was a big breakthrough for the industry (ibid: 478).

At the beginning of World War I in 1914, chemists in the petroleum industry were induced by booming prices to find methods of refining hydrocarbon compounds (benzol and toluol) needed for the manufacture of explosives. Previously the domain of the domestic coal tar industry, which was taxed to the limit by rising orders for the military, methods of production were developed by Richmond chemists. In July of 1915, a small plant was built at Richmond which utilized a series of retorts in conjunction with a 1,500 gallon steam still and fractionating column, obtained from the chemical refinery equipment firm of Walter E. Lummus in Boston, to separate out the distillates into pure ether, benzol and toluol (ibid: 480). In 1916, the plant was improved by construction of a 7,000 gallon still to handle larger quantities of distillates, and the addition of a relatively large fractionating tower adapted from the design of the Lummus tower. The tower developed for the improved benzol and toluol plant was the progenitor of the "fine fractionation" tower which constituted a major development in crude still technology after World War I (ibid: 481). At the close of the war, however, the demand for explosives ingredients dropped off, and Standard sidelined the project.

After World War I, the oil refining industry was maturing, and the new directive followed by Standard Oil was how to get the most out of each barrel of oil. For this task it was the college bred chemists who rose to meet the challenge, eclipsing the older "practical" refiners (ibid: 485). Demand for gasoline and lubes for automotive purposes continued throughout the century to rise steadily, although the economic depression of the 1930s no doubt had a great impact on production levels. Despite the general slowdown, in the mid- to late 1930s, numerous physical changes were made to the refinery complex. Among these were the construction of the Vapor Recovery Plant in 1933, the No.

10 Battery in 1935, the No. 1 Power Plant in 1936, the No. 11 Battery in 1938 and a new salt water pump station building in 1935.

World War II not only brought an end to the Depression, but proved a great stimulus to the petroleum industry. With the national security at stake, the U.S. government called upon the major oil companies to assist with the production of fuels, lubricants and ingredients for explosives (Whitnah 1944: 38). At Richmond, this need was addressed by the construction of an aviation fuel plant in 1942, including the Aromatics Recovery Unit, facilities for the recovery of toluene in 1944, and the LPG Boiler House (Bill Alton, personal communication, 3/16/90).

The years following the Second World War witnessed many profound societal changes to which the Richmond refinery responded. Postwar economic prosperity was evidenced, in part, by vigorous sales of automobiles and other forms of motorized transportation. The air travel industry, another major consumer of refined petroleum products, likewise experienced a similar pattern of rapid growth. The Korean Conflict of 1950-53, and later the Vietnam War, heightened the demand for products from the Richmond refinery. In the 1960s, other influences on the refining industry included the rise of the environmental movement, with its emphasis on reducing levels of pollution, and the awareness of the finite nature of oil reserves, leading to the demand for gas thrifty internal combustion engines.

The history of the Richmond refinery is characterized by continual change. The physical composition of the refinery complex was expanded repeatedly, and specialized refining facilities were erected, removed, and altered often over time to meet the changing demands of the market, as new products and processes were developed and others abandoned, and to handle the variable nature of crude oil stocks from different localities. The present refinery is a mixture of new and old facilities, and the process of change continues.

FIELD RESULTS

FIELD RECONNAISSANCE

On March 15, 1990, Beth Padon and Jason Marmor met with William Alton of Chevron Oil Company, Don Walker of Fluor Daniel, and other LSA employees for a review of the proposed project area. On March 16, Jason Marmor and Pat Jertberg returned to the plant and specifically reviewed the potentially historic structures noted within the impact areas.

The planned modernization project will involve several portions of the existing refinery. The ongoing operations of the refinery densely cover several acres of the Chevron plant. Since pipes, buildings and equipment that cover much of the plant's grounds precluded a systematic survey of the proposed project, Mr. Alton conducted a drive through of the plant, and reviewed all the specific areas of the proposed modernization project with LSA. The specific areas of impact include some existing structures, parking areas, equipment yards, the stone quarry and a few open areas.

The field review started behind the company's cafeteria and left the plant's main area of operations to review the eastern section of the plant. The crude unit located near the cafeteria will be shut down when the modernization project is complete. Here, many pipes and lines cover the ground as well as follow overhead routes. Three potentially historic structures are located within this area. These include the Power Plant No. 1, the No. 10 Battery and the No. 11 Battery. The Power Plant No. 1 is a steam plant located west of Main Street, while Battery Nos. 10 and 11 are located on Midway. Along Castro Street, several open areas have been designated as staging areas or parking lots for the modernization project. These proposed staging areas are currently serving as parking lots, and have been graded, partially paved or covered with loose gravel.

Next, Mr. Alton drove along Xylene Street within the refinery grounds. Again, several areas have been designated as staging areas for the future construction. In this portion of the plant's property, foundations of an earlier ammonia processing plant, gravel covered equipment yards, soil treatment areas and a storage yard are found. Only one area, located within the existing marsh boundaries, appears undisturbed by the refinery operations.

The field review was continued along Channel Street, passing the bioreactor area and the water separation plant. The area between Channel and Petroleum Streets is the most industrialized section of the plant. Here, pipes, tanks, buildings, smoke stacks and structural supports obscure the ground. The

flexicoker will be constructed in this area. The new crude unit will also be constructed in this area. Bulldozing in this section has already cleared and graded the ground. The field review also included a drive by of the area for the new MTBE plant on Octane Street. Here, a processing plant built in the late 1950s will be taken down for the new unit.

The field crew left the main plant area along Channel Street and drove northwest to the existing recreation area. The company maintains a ball field, tennis courts, a rod and gun club and recreation center for the employees. The ball field and courts may be used as staging areas for the proposed construction. These recreational areas have been graded, leveled and landscaped.

The next area of the field review included a portion of the southern side of the refinery. Most of the refinery's storage tanks have been built into the hill slopes and on the ridge top of the peninsula. One group of tanks is located within an existing quarry on the south side of the peninsula. Additional tanks are planned for this area. Quarry activities over the past 80 years have removed rock and soil for several acres and for several hundred feet below the ridge top. No original ground remains in this area.

We completed the field review with a drive by of the pump house used in saltwater processing, and a quick check of the potentially historic structures near the cafeteria. The saltwater station is located on the south side of the refinery and south of I-580. This area is also impacted by pipes that run over the ground and above ground into the plant.

On March 16, 1990, Jason Marmor and Pat Jertberg returned to the Chevron plant and, with Mr. Alton, conducted a careful review of the potentially historic structures. No photographs were taken and the field work did not include interior inspections.

On March 29, 1990, Beth Padon and Fran Govean returned to the Chevron plant and, with Juan Duran from Fluor Daniel, conducted a careful review of the three remaining open and undisturbed areas. No photographs were taken due to security regulations. Following this survey and initial report preparation, two of these areas have subsequently been eliminated from the project. However, the proposed haul road was added to the project. This project will extend into San Francisco Bay with a dock built for the shipment of supply.

RESULTS

Historical Resources

A total of seven potentially historic refinery facilities were examined, reviewed for historic integrity, and documented on standardized "Historic Resources Inventory" forms (DPR 523, Rev. 11/89). Chevron USA. provided photographs of these units to accompany the inventory forms. The completed forms are included in Appendix B. Figure 3 shows the location of the potentially historic structures.

The seven potentially historic refinery facilities investigated and recorded are listed below, followed by summary descriptions of each site.

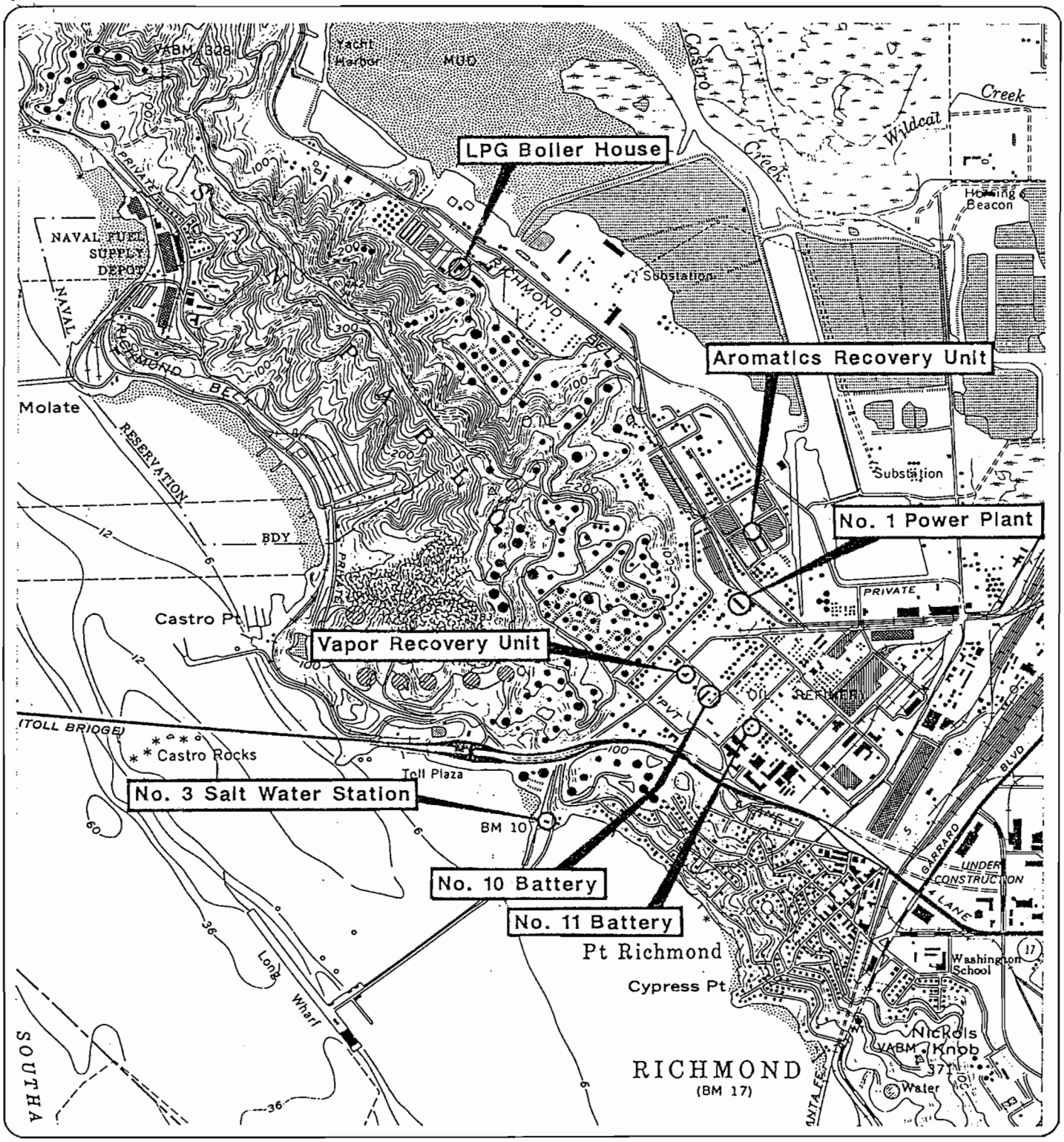
Potential Historic Property	Date of Construction
1) No. 10 Battery	1935
2) No. 11 Battery	1938
3) Vapor Recovery Plant	1935
4) No. 3 Saltwater Station	1935
5) No. 1 Power Plant	1936
6) Aromatics Recovery Unit	1942
7) LPG Boiler House	1944

No. 10 Battery

This is one of two active crude oil distillation units affected by the project. It is located adjacent to the Midway Street pipeway at the southwest corner of Center and Midway Streets, and is used in the initial treatment of crude oil for separation into a variety of petroleum products prior to further processing in other areas of the refinery. The battery consists of two sheltered furnaces, a vacuum distillation column, an atmospheric column, a single exhaust stack and associated plumbing.

No. 11 Battery

This unit is similar in design and function to the No. 10 Battery, and is also located adjacent to the Midway Street pipeway at the southeast corner of Division and Midway Streets. This unit is symmetrically arranged, and features two large brick enclosed furnaces covered by corrugated iron roofed structures. Each furnace is connected to two distillation columns in the rear, and a single exhaust stack in front. Multiple pipes and catwalks connect the various components.



Map Source: USGS 7.5' Quad - San Quentin, Ca., 1980

FIGURE 3

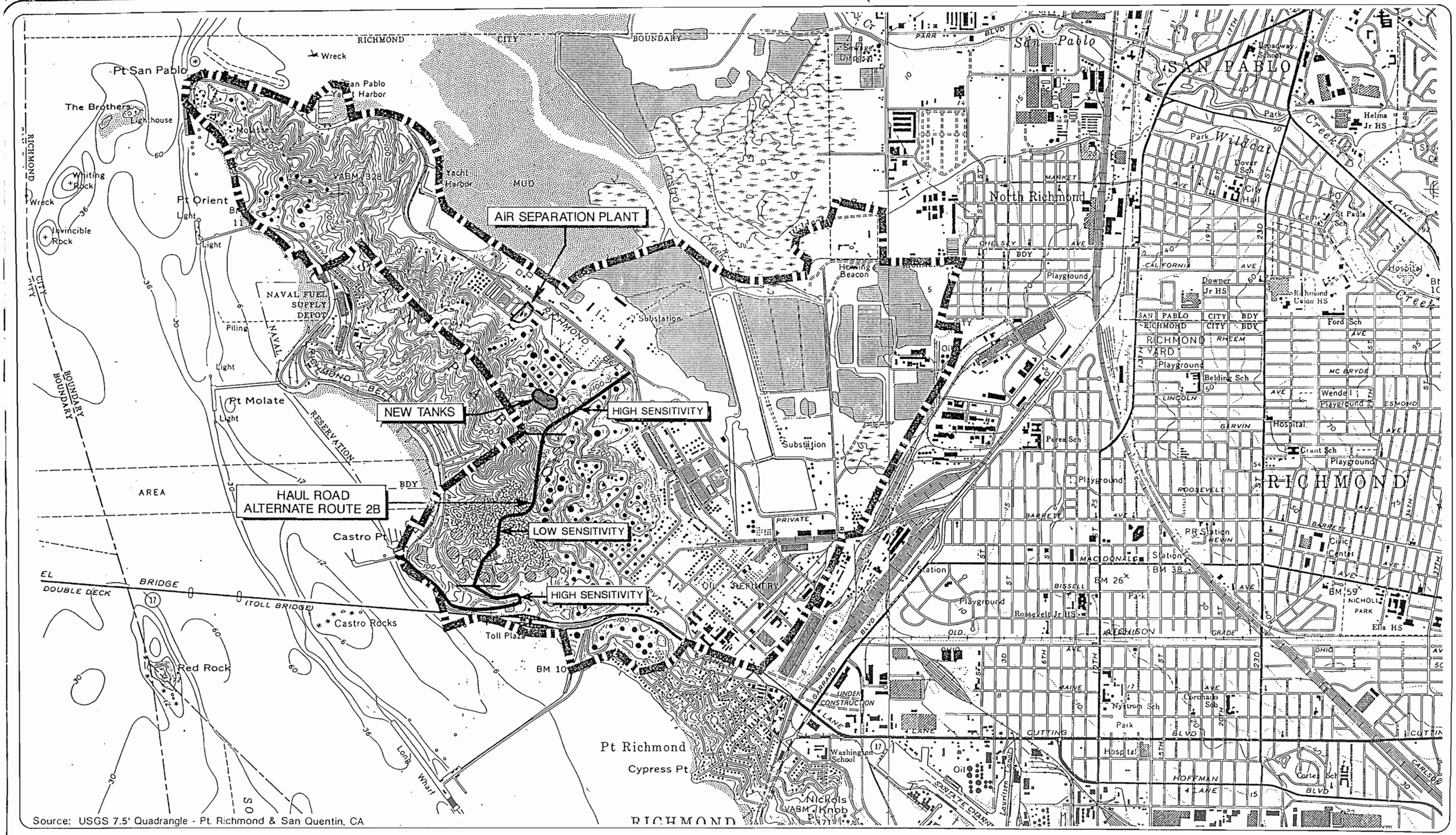
SCALE IN FEET

0 1000 2000

CHEVRON RICHMOND REFINERY
POTENTIAL HISTORIC RESOURCES

lsa

3/30/90:GD



SCALE IN FEET

0 1000 2000

4/25/90:KF

Study Area Boundary.

FIGURE 2

LOCATION OF TWO SITES AND HAUL ROAD POTENTIAL HIGH SENSITIVITY

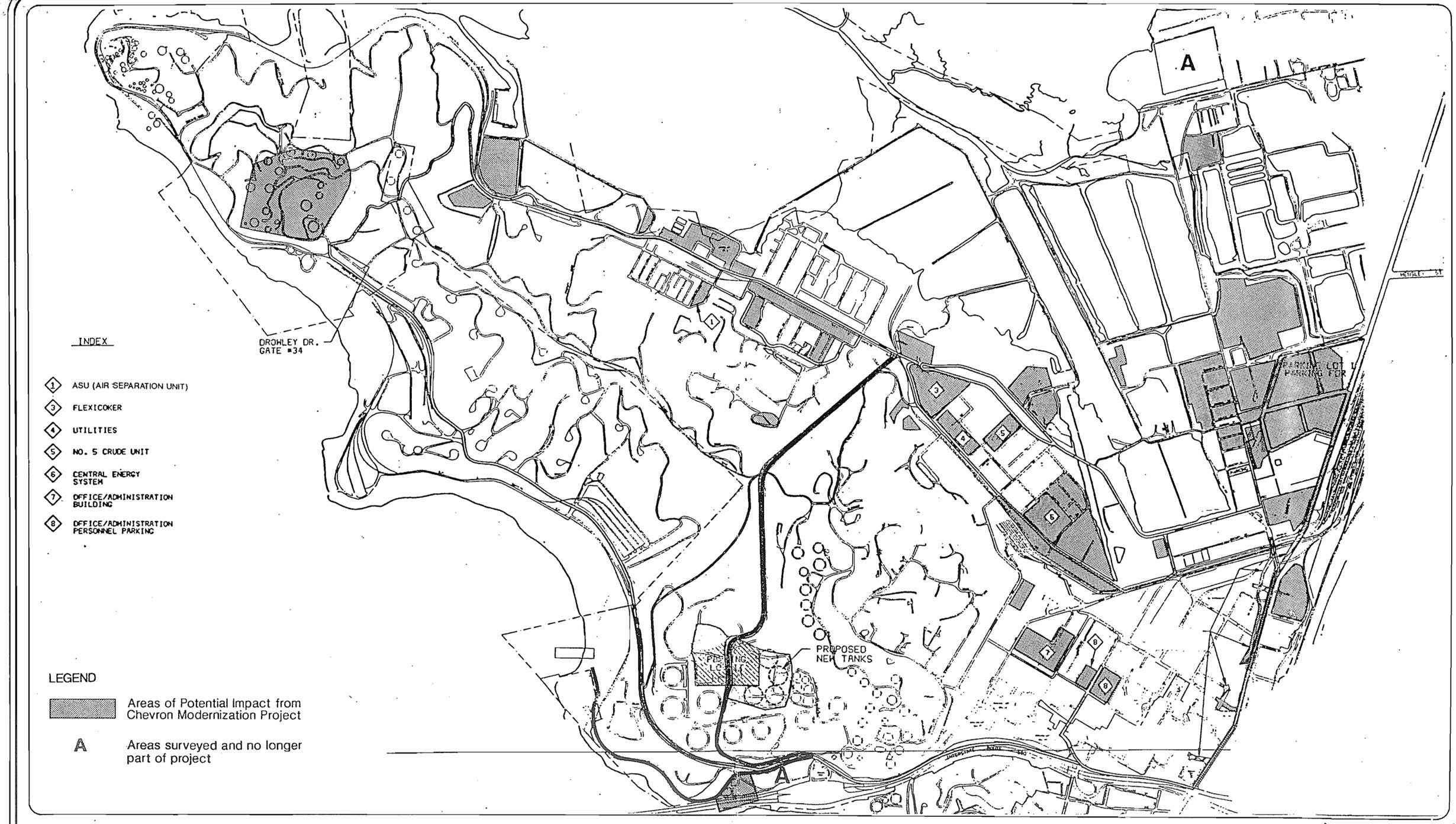
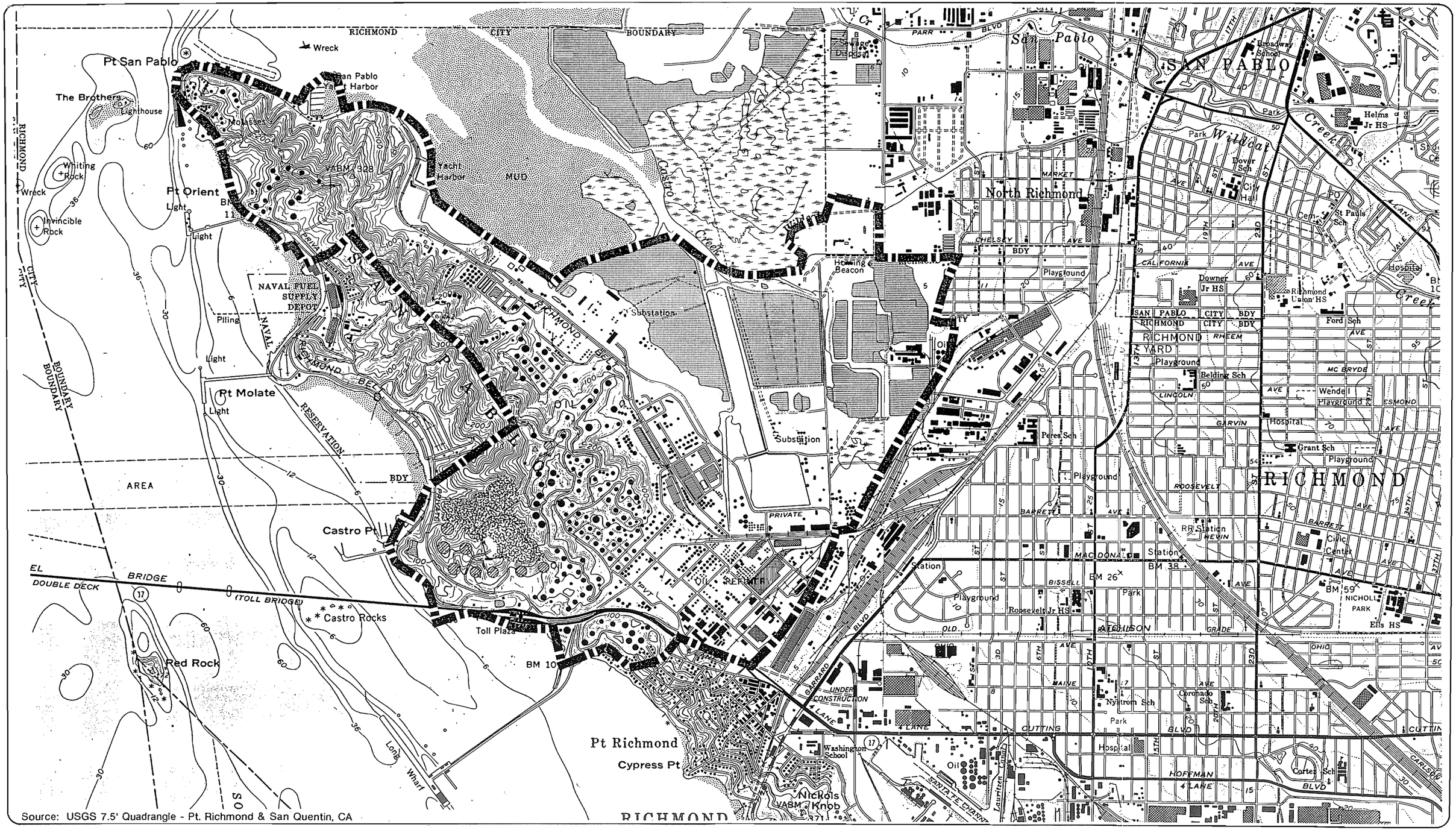


FIGURE 4

AREAS SURVEYED FOR ARCHAEOLOGICAL RESOURCES



SCALE IN FEET

0 1000 2000

4/5/90:KF

Study Area Boundary

FIGURE 2

PROJECT LOCATION

Vapor Recovery Plant

Located at the southeast corner of Main and Midway Streets, in the portion of the refinery where initial refining of crude oil takes place, this facility collects vapors from crude oil distillation, removes undesirable products from them and sends the compressed vapors on for further processing via the Midway Street pipeway. The unit consists of two connected compressor sheds, a solitary column, two small storage tanks and a complex array of interconnecting pipes.

No. 3 Saltwater Station

This pumping plant is located at the western terminus of Main Street, on the shore of San Francisco Bay at the foot of the long wharf. Several large pumps are used for drawing seawater from the bay and sending it through a gap in the hills to the refinery for cooling purposes via multiple pipelines. The pumps are housed in a large rectangular concrete and brick building topped by a hipped red tile roof. Opposite the building, across the access road, is a smaller electrical substation building of similar design.

No. 1 Power Plant

This is a massive rectangular corrugated iron structure which houses steam and electrical generating machinery needed for refinery operations. The building is three tiered, and along the rear of one side elevation are three massive concrete stacks, as well as a newer metal stack. The plant is located adjacent to multiple railroad tracks running east-west in the heart of the refinery. Over the years, the power plant has been extensively modified internally and externally to increase its output.

Aromatics Recovery Unit

Located at the southeast corner of Chemical and Cracking Streets, this is an abandoned and partially dismantled complex constructed during World War II for the production of toluene, a petroleum distillate used as an ingredient in explosives and as a high octane gasoline additive. The remaining structures of this unit include three furnace structures, a solitary exhaust stack, several aromatic recovery columns and a maze of pipes. The furnaces are brick enclosed, and are sheltered under corrugated iron roofed structures. The facility is incomplete and in poor condition, and all of its exposed metal is badly rusted.

LPG Boiler House

This unit is a rectangular corrugated structure with a shed roof, which houses boilers for steam production used in many refinery processes. It is sited near the eastern margin of the Point San Pablo peninsula, tucked against the base of the ridge at the southwest corner of Octane and Bead Streets. The LPG Boiler House was built in World War II as part of a wartime aviation fuel plant on the refinery. Four stacks are located along one elevation of the building, and numerous pipes lead to and from it via elevated and depressed pipeways. The structure housing the boilers is simple and strictly utilitarian in design.

Archaeological Resources

Figure 4 indicates the three open areas surveyed on March 29, 1990. Subsequent to our survey and initial report preparation, two of these areas were dropped from the project. These eliminated areas are marked with an "A" in Figure 4. The survey also included a field review for CA-CCo-278. This site is described as being located on a promontory overlooking the San Francisco Bay. Based upon the USGS map and the oil refinery maps, this knoll appeared to be still undisturbed. However, a field inspection found that the knoll has been graded and cut for a trap and skeet facility for Chevron employees. The facility includes a picnic area, a paved parking area, a small building and the trap and skeet game area. The facility covers an area approximately 70 meters by 32 meters. No evidence of the prehistoric site was found. It appears that approximately two to three meters of soil have been removed from the knoll top.

Next, the survey reviewed the area located on the south side of San Pablo Ridge and within an existing tank field. Part of this area includes a gently sloping hillside and ravine. The on-foot survey carefully inspected the hillside and ravine portion for any evidence of prehistoric artifacts or midden soil. Disturbance in this area includes a pipeline in the ravine, a dirt road from the top of the hill slope to the small reservoirs below and piles of fill soil. Ground visibility in this area ranged from only 25% to 50% due to dense ground cover. Cuts in the ravine and the road cuts showed no evidence of prehistoric activity in this area.

The third stop of the survey included the property located between the San Rafael Bridge and Point Molate Road. The archival search indicated that CA-CCo-284 is located within this area. The survey in this area included a careful systematic on-foot review of the area. The crew walked parallel transects, five to ten meters apart, over the entire property. Most of the area has been bulldozed, and structures previously noted on the property have been removed. The railroad bed is still visible, although no tracks remain. At the far eastern end of the property, several piles of fill soil cover the ground. Thick vegetation within the eastern end of the property also covered several earthen berms. Throughout the bulldozed area, the crew noted pieces of ceramic pipe, rebar fragments, paper, glass fragments and lumber pieces. No artifacts or evidence of midden soil were found. It is possible that the construction of the San Rafael Bridge destroyed part of the archaeological site that was recorded near the shore. Here, asphalt to retard soil erosion covers the slope overlooking the shore.

Finally, the crew walked over the open land located north and west of the main refinery plant. Here, thick vegetation covers most of the property and prevented a clear view of the ground surface. Also, concrete foundations and platforms, lumber piles, a wrecked truck, tires, and modern trash are found throughout this portion of the refinery's property. No evidence of prehistoric use of the area was noted, although the ground cover prevented an adequate review.

CONCLUSIONS AND RECOMMENDATIONS

Archaeological Resources

The field review confirmed that the archaeological site (CA-CCo-284) no longer exists and, therefore, would not be impacted by the modernization project. Three sites are outside but within 400 feet of direct impact locations, as they are outlined on the Chevron USA Modernization Project maps provided. The three sites located within 400 feet of impact areas are considered to be within areas of potential indirect impact resulting from possible off-site project related activities, such as construction crew use of these areas. The sites as they relate to the modernization project are listed on Table B. In addition, four of the impact areas are designated as a third or fourth priority. Due to the sensitivity of archaeological resources, a map showing the location of these resources has been provided to Fluor Daniel as a separate and confidential appendix. During construction, these site areas should be considered sensitive for archaeological resources and access to these areas eliminated in order to avoid indirect impacts to these sites.

It is probable that project related activities, as they are now formulated, will not adversely impact archaeological resources. However, buried remains go undetected during a walk over survey. If buried resources are uncovered during the construction of the modernization project, a qualified archaeologist shall be retained to assess the finds and prepare a data recovery program if needed.

Based upon the disturbed condition of the northern open area, the area covered with vegetation, it appears unlikely that prehistoric resources are buried here. However, if this area is selected for use, a field review of this area by a qualified archaeologist is recommended when the area is initially cleared.

Historical Resources

The Richmond refinery modernization project will involve the removal of a number of extant refinery facilities, and the construction of new facilities in those locations. The construction of the proposed Flexicoker unit will not affect any potential historic resources. Construction of the proposed No. 5 crude unit will require the demolition or the shutdown of several potentially historic resources: the Nos. 10 and 11 Batteries (crude distilling units), the

TABLE B

IMPACT ASSESSMENT FOR ARCHAEOLOGICAL SITES: CA-CCO-227, -278, -281, -284, -436

Site Number	Project Activity Outlined	Chevron Designation	Proximity (+/-)
CA-CCo-277	1) Potential laydown - 3rd priority 2) Plot space for laydown only-no hot work 3) Plot space for laydown with hot work	1)#100 2)#41 3)#33	1)75' 2)75' 3)300'
CA-CCo-281	1) Potential laydown - 4th priority 2) Potential laydown - 3rd priority	1)#100 2)#100	1)300' 2)600'+
CA-CCo-436	Potential laydown - 3rd priority	#100	-75'

Chevron Designations

#100 = These areas not considered at this time
#41 = Plot space for laydown only, no hot work
#33 = Contractor's laydown - 140,950 sq. ft.

Vapor Recovery Plant, and the No. 3 Saltwater Station. Construction of the proposed new Central Energy System will impact three potentially historic resources: the No. 1 Power Plant, the LPG Boiler House and the Aromatics Recovery Unit.

A total of seven discrete refinery process facilities, which were over or nearly 50 years old and which will be affected by the project, were reviewed for historical significance. While 50 years is a standard measure of time considered necessary before a given property may be considered "historic" for purposes of significance evaluation, properties included in the modernization project which were a few years below this threshold were also reviewed. This course was followed in order to address all potentially historic resources with the expectation that the modernization project will be of long duration.

The seven potentially historic properties, all of which are specialized 20th century industrial subprocess plants for oil refining, are listed below:

	Potential Historic Property	Date of Construction
1)	No. 10 Battery	1935
2)	No. 11 Battery	1938
3)	Vapor Recovery Plant	1935
4)	No. 3 Saltwater Station	1935
5)	No. 1 Power Plant	1936
6)	Aromatics Recovery Unit	1942
7)	LPG Boiler House	1944

Other refinery facilities scheduled for replacement or removal as part of the modernization project which were substantially younger than the 50 year limit were not assessed. No previously recognized historic resources are included within the scope of the modernization project, and no potentially historic resources were identified in the project area(s) which predated the refinery.

Evaluation Criteria and Determinations

The assessment of significance of historical and archaeological properties is based upon established criteria set forth in the National Historic Preservation Act of 1966 (36 CFR 60.4). Four criteria are used to determine the eligibility of sites to the *National Register of Historic Places*, the nation's list of heritage resources important to the local, State, or national level. Generally, the *National Register* criteria stipulate that the properties under consideration meet an age requirement of 50 years and possess integrity

of location, design, materials, workmanship, setting, footing and association. Further, "the quality of significance in American history, architecture, archaeology, engineering, and culture is present in district, sites, buildings, structures, and objects that:

> *"A) Are associated with events that have made a significant contribution to the broad patterns of our history; or*
>
> *"B) Are associated with the lives of persons significant in our past; or*
>
> *"C) Embody the distinctive characteristics of a type, period, construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or*
>
> *"D) Have yielded, or may be likely to yield, information important in prehistory or history [36 CFR 60.6]."*

None of the seven potentially historic resources meets the *National Register* criteria for historical significance. It is highly unlikely that any individual refinery process facility would qualify on its own as a significant historic resource, unless it was a prototype of a new technological approach which made a major impact on the industry, or was the only surviving example of a very early refining system. Development of the trunk pipeline, for instance, is considered to be the major technological innovation in the petroleum industry during the late 19th century (Johnson 1967: 671), and extant pipelines from this era would have potential significance as individual engineering structures.

Loss of integrity is probable but undetermined for all of the potentially historic resources evaluated here. With the exception of the Aromatics Recovery Unit, all of the refinery process facilities remain in use today, and over the years may have experienced structural changes from maintenance and upgrading. All seven structures have suffered some loss of integrity, although the degree of loss for each is unverifiable without a lengthy and laborious investigation of documentary records. It was impossible to distinguish or verify the extent and nature of changes to each of these units.

Of the four *National Register* criteria, only A, B, and C are applicable. For the Nos. 10 and 11 Batteries, the Vapor Recovery Plant, the No. 3 Saltwater Station, and the No. 1 Power Plant, none appears to qualify under Criterion A.

While it is possible that the refinery, as a whole, has "made a significant contribution to the broad patterns of our history," individual components, built at various times, have not. Under Criterion B, none of these individual refinery components are known to be associated with significant persons. Finally, under Criterion C, all of the above specialized refinery process facilities are undistinguished examples of engineering works using standard technological solutions for petroleum refining applications found at virtually any 20th century refinery in the United States. The likelihood of diminished integrity of design, materials, and historic setting of these units also reduces their potential for significance under Criterion C.

The two remaining potential historic resources, the Aromatics Recovery Unit and the LPG Boiler House, are associated with aviation fuel and explosives production for the military in World War II. However, the physical integrity of the Aromatics Recovery Unit is seriously compromised by partial dismantling of portions of the structure, as well as by the effects of weathering after the unit was abandoned and maintenance discontinued some years ago. Therefore, this facility no longer retains sufficient integrity to warrant further evaluation of significance.

The LPG Boiler House appears to have retained a good degree of original integrity, at least in its exterior. However, the unit does not meet any of the *National Register* criteria for eligibility. Although associated with a potentially significant "broad pattern of history" under Criterion A, the Boiler House is only one component of the wartime aviation fuel plant, and alone is a generic example of industrial steam generating technology and engineering which is not unique to the wartime plant. No evidence was found to link the LPG Boiler House to any significant persons (Criterion B), nor was it found to be of any importance as an example of "a type, period, or method of construction" (Criterion C).

None of the seven potential historic resources investigated meet the *National Register* criteria and, therefore, none qualifies for identification as historic resources. Therefore, no impacts to historic resources are expected as a result of implementation of the proposed Richmond refinery Modernization Project.

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Napa, Calif., 1902 (reprinted 1932), scale 1:125,000.

Richmond, Calif., 1959, photorevised to 1980, scale 1:24,000.

San Quentin, Calif., 1959, photorevised to 1980, scale 1:24,000.

U.S. War Department, Army Corps of Engineers Topographic Quadrangle Map:

San Francisco, Calif., 1942, scale 1:62,500.

State of California - The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
OFFICE OF HISTORIC PRESERVATION

HISTORIC RESOURCES INVENTORY

IDENTIFICATION AND LOCATION

1. Historic Name: unknown
2. Common or Current Name: No. 10 Battery
3. Number & Street: Southside of intersection of Midway and Center Streets, Chevron Refinery — Cross-Corridor:
   City: Richmond — Vicinity Only: — ZIP: — County (3-Letter Designator):
4. UTM Zone: — A: — B: — C: — D:
5. Quad Map No.: 466B — Parcel No.: — Other:

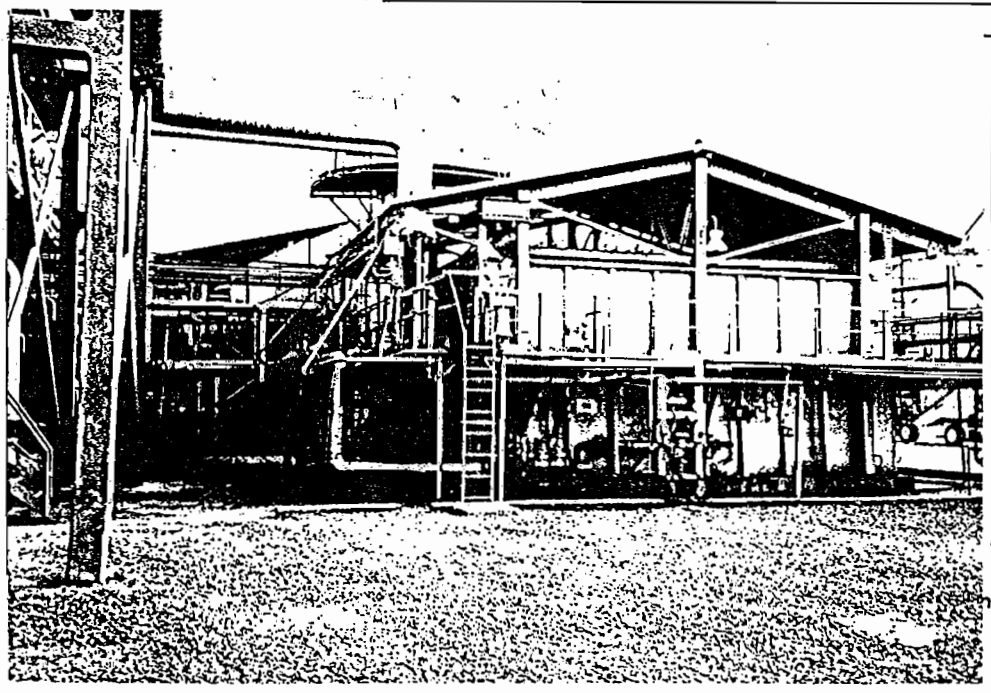
Ser. No.: - - -
National Register Status: 6Z1
Local Designation:

DESCRIPTION

6. Property Category: structure — If District, Number of Documented Resources: 7
7. Briefly describe the present physical appearance of the property, including condition, boundaries, surroundings, and (if appropriate) architectural style.

This unit consists of a complex of related features. Two all-metal crude oil distillation furnaces are housed under frames topped by corrugated iron gable roofs. Between these two structures is a common stack (approx. 15' in diameter at the base, tapering to approx. 12'), rising to a height of approx. 150'. Adjacent to the furnaces and stack are two columns of similar diameter (approx. 15'). The vacuum column is approx. 125' tall, and is sited to one side of the furnaces; the atmospheric column is approx. 135' tall, and is located to the rear of one of the furnace structures. Both columns are fitted with catwalk segments and ladders for access. An 80' tall frame with piping is situated between the two columns. Pipes from No. 10 Battery lead to the Midway Street elevated pipeway.

8. Alterations & Date: Unknown
9. Related Features on Property: oil refining facilities, storage tanks, administrative bldgs., roads



10. Planning Agency: City of Richmond Planning Dept.
11. Owner & Address:
12. Type of Ownership: private
13. Present Use: active refinery unit
14. Zoning: M-3
15. Threats: proposed removal

...nto, CA 94296-0001

DEPARTMENT OF PARKS AND RECREATION
OFFICE OF HISTORIC PRESERVATION

HISTORIC RESOURCES INVENTORY

IDENTIFICATION AND LOCATION

1. Historic Name: unknown
2. Common or Current Name: LPG Boiler House
3. Number & Street: Southwest corner of Octane and Bead Streets, Chevron Refinery Cross-Corridor:
   City: Richmond Vicinity Only: ZIP: County (3-Letter Designator):
4. UTM Zone: A: B: C: D:
5. Quad Map No.: 466B Parcel No.: Other:

Ser. No.:
National Register Status: 6Z1
Local Designation:

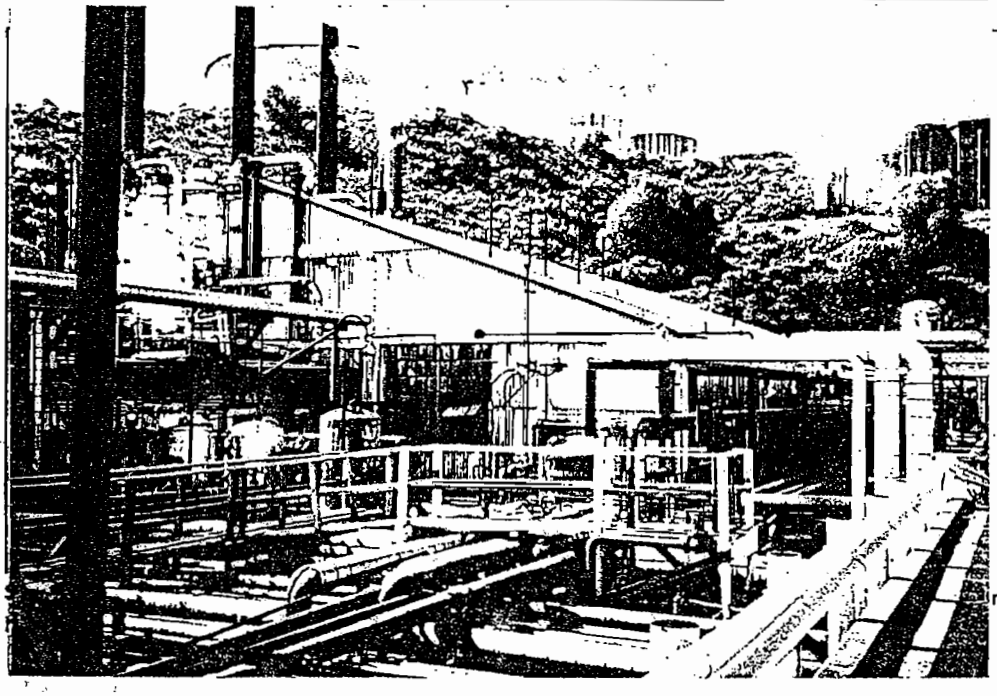
DESCRIPTION

6. Property Category: structure If District, Number of Documented Resources:
7. Briefly describe the present physical appearance of the property, including condition, boundaries, surroundings, and (if appropriate) architectural style.

This is a rectangular utility structure housing boilers for steam generation used in the Low Pressure Gas (LPG) refining process. The structure has a shed roof, and is sheathed with corrugated iron. Several units of multipane windows are installed on the building's elevations to admit light inside. Behind the structure a short distance are four steel stacks, each of which is approx. 4' in diameter and about 125' tall. The two center stacks appear to be older, since they are well rusted, whereas the outside two are not. A complex network of piping of various diameters surrounds the structure. A mass of pipes exits one end of the boiler house in both elevated and depressed pipeways carrying steam to other refining process facilities nearby.

8. Alterations & Date: unknown

9. Related Features on Property: oil refining facilities, storage tanks, administrative bldgs., road



10. Planning Agency: City of Richmond Planning Dep
11. Owner & Address:
12. Type of Ownership: private
13. Present Use: steam generation
14. Zoning: M-3
15. Threats: planned replacement

nto, CA 94296-0001

DEPARTMENT OF PARKS AND RECREATION
OFFICE OF HISTORIC PRESERVATION

HISTORIC RESOURCES INVENTORY

IDENTIFICATION AND LOCATION

Ser. No. _____
National Register Status 6Z1
Local Designation _____

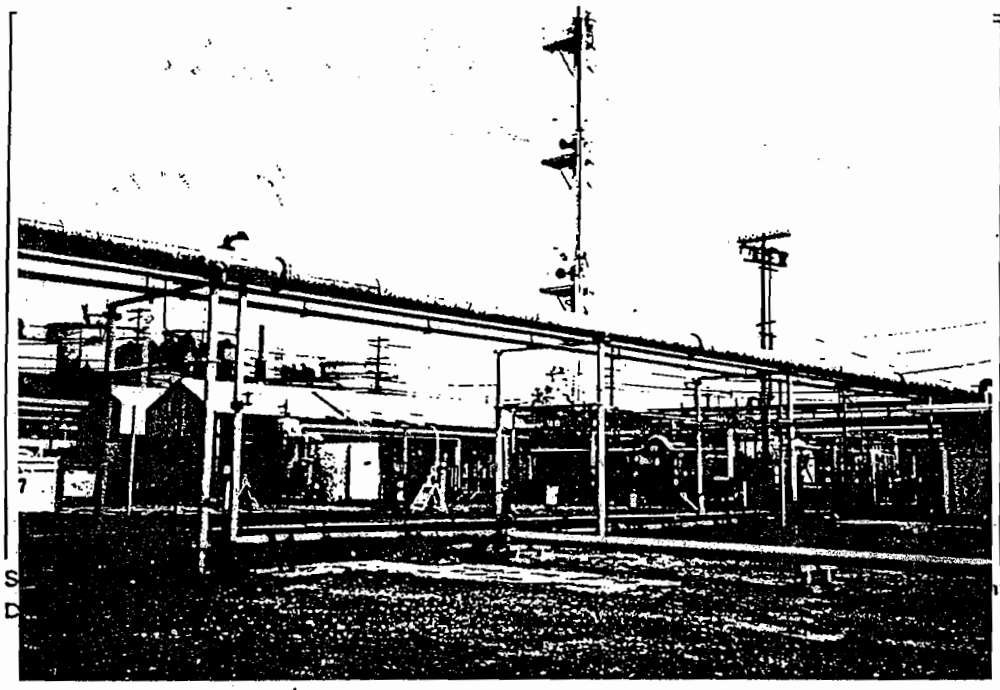
1. Historic Name unknown
2. Common or Current Name Vapor Recovery Plant
3. Number & Street South side of intersection of Midway and Main Streets, Chevron Refinery Cross-Corridor _____
   City Richmond Vicinity Only ___ ZIP _____ County (3-Letter Designator) _____
4. UTM Zone ___ A _____ B _____ C _____ D _____
5. Quad Map No. 466B Parcel No. _____ Other _____

DESCRIPTION

6. Property Category structure If District, Number of Documented Resources 7
7. Briefly describe the present physical appearance of the property, including condition, boundaries, surroundings, and (if appropriate) architectural style.

This unit is a complex assemblage offeatures. A 100' high column (4' in diameter) is adjacent to two connected corrugated iron compressor houses. These structures are open on two sides, and have gable roofs of sheet metal. Opposite the column are two small storage tanks (#1348 and #901), one of which was not being used. A low brick retaining wall surrounds part of the unit. A maze of pipes lead to the Midway Street elevated pipe way, which runs past all of the crude distillation units nearby.

8. Alterations & Date unknown
9. Related Features on Property oil refining facilities, storage tanks, administrative bldgs., road



10. Planning Agency City of Richmond Planning Dep
11. Owner & Address
12. Type of Ownership private
13. Present Use active refinery un
14. Zoning M-3
15. Threats proposed removal

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State of California - The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
OFFICE OF HISTORIC PRESERVATION

HISTORIC RESOURCES INVENTORY

IDENTIFICATION AND LOCATION

Ser. No. _____ - _____ - _____
National Register Status 6Z1
Local Designation _____

1. Historic Name Unknown
2. Common or Current Name No. 3 Salt Water Station
3. Number & Street Western terminus of Chevron refinery's Main Street, on San Francisco Bay Cross-Corridor _____
   City Richmond Vicinity Only X ZIP _____ County (3-Letter Designator) _____
4. UTM Zone ____ A _____ B _____ C _____ D _____
5. Quad Map No. 4668 Parcel No. _____ Other _____

DESCRIPTION

6. Property Category building If District, Number of Documented Resources 7
7. Briefly describe the present physical appearance of the property, including condition, boundaries, surroundings, and (if appropriate) architectural style.

Situated on the shore of San Francisco Bay, this is a two story concrete and brick building which is rectangular in plan. The structure has a hipped roof clad with Mediterranean-style red tiles. The long elevations have six large inset bays of multi-pane windows surrounded by a brick border. Above the window bays are rectangular panels of exposed brick. A lower height portion extends from the north end of the building. On the seaward side of the station, multiple pipes and their supporting framework draw water from the bay; it is pumped out towards the rest of the refinery in multiple pipes emerging from the north end of the landward side of the building. Other than the contrasting use of concrete and brick, the pump building is devoid of ornamentation, reflecting its utilitarian nature.

Opposite the pumping station on the other side of the access road is a small one story electric substation building of similar style.

8. Alterations & Date none noted
9. Related Features on Property oil refining facilities, storage tanks, administrative bldgs., roads

10. Planning Agency City of Richmond Planning Dept.
11. Owner & Address
12. Type of Ownership private
13. Present Use pumping plant
14. Zoning M-3
15. Threats planned shutdown

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State of California - The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
OFFICE OF HISTORIC PRESERVATION

HISTORIC RESOURCES INVENTORY

IDENTIFICATION AND LOCATION

1. Historic Name: unknown
2. Common or Current Name: No. 1 Power Plant

Ser. No. ____ - ____ - ____
National Register Status: 6Z1
Local Designation: ____

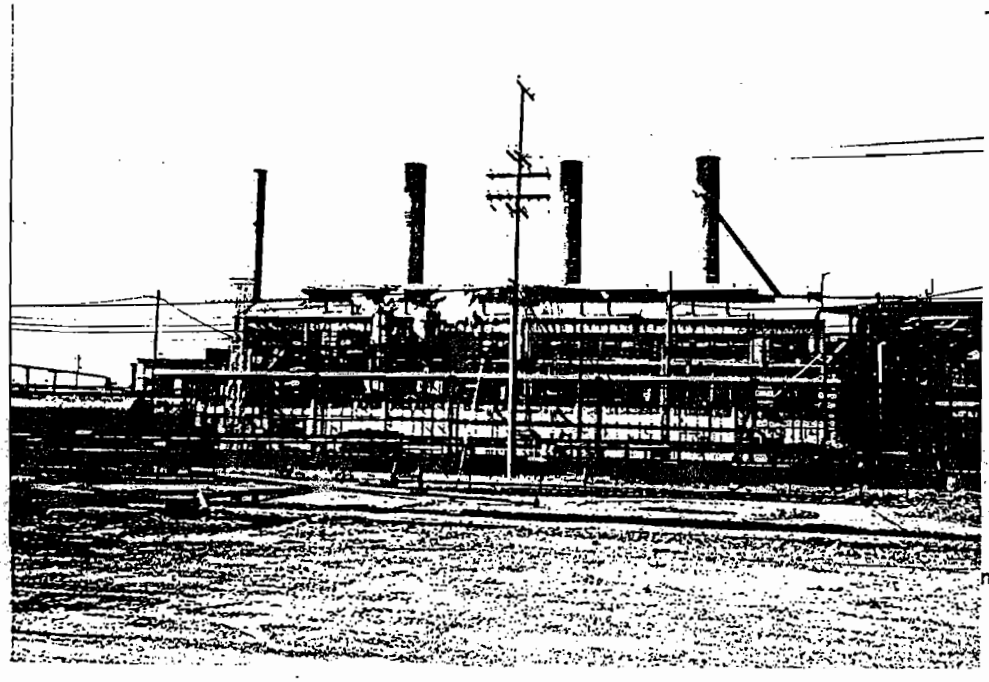
3. Number & Street: Chevron Refinery Cross-Corridor: ____
   City: Richmond Vicinity Only: X ZIP: ____ County (3-Letter Designator): ____
4. UTM Zone: ____ A: ____ B: ____ C: ____ D: ____
5. Quad Map No.: 466B Parcel No.: ____ Other: ____

DESCRIPTION

6. Property Category: building If District, Number of Documented Resources: 7
7. Briefly describe the present physical appearance of the property, including condition, boundaries, surroundings, and (if appropriate) architectural style.

This is a large three-tiered corrugated iron building. The two higher stories are each recessed, and the uppermost is topped with a moderately pitched gable roof. Each elevation is broken by expansive banks of multipane windows to admit light inside the plant. Numerous small diameter pipes emitting steam protrude from the roof of the building. Three large diameter massive concrete stacks (approx. 200' tall) are located adjacent to the structure along one long elevation; another smaller diameter metal stack of similar height is sited at the south end in line with these. The power plant is located in the midst of the main industrial area of the refinery, close to multiple railroad tracks which traverse the property.

8. Alterations & Date: many reported, types and dates unknown
9. Related Features on Property: oil refining facilities, storage tanks, administratives bldgs., roads



10. Planning Agency: City of Richmond Planning Dept.
11. Owner & Address: ____
12. Type of Ownership: private
13. Present Use: power and steam generation
14. Zoning: M-3
15. Threats: planned replacement

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State of California - The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
OFFICE OF HISTORIC PRESERVATION

HISTORIC RESOURCES INVENTORY

IDENTIFICATION AND LOCATION

Ser. No. _____ - _____ - _____
National Register Status 6Z1
Local Designation _____

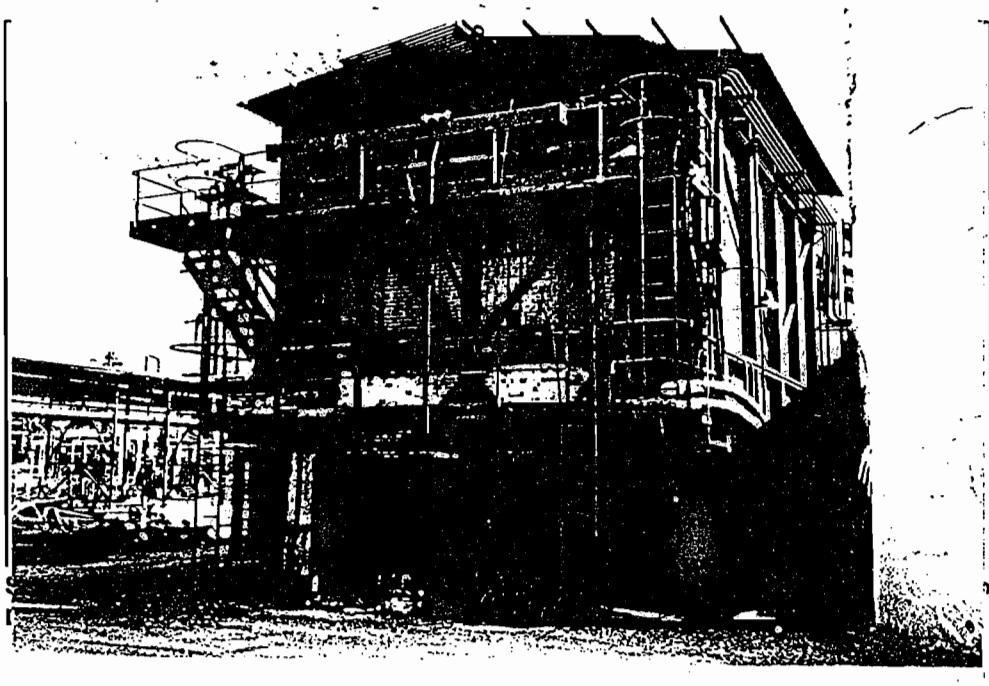
1. Historic Name unknown
2. Common or Current Name Aromatics Recovery Unit
3. Number & Street Southeast corner of Cracking and Chemical Streets, Chevron Refinery Cross-Corridor _____
   City Richmond Vicinity Only ___ ZIP _____ County (3-Letter Designator) _____
4. UTM Zone ___ A _____ B _____ C _____ D _____
5. Quad Map No. 466B Parcel No. _____ Other _____

DESCRIPTION

6. Property Category structure If District, Number of Documented Resources 7
7. Briefly describe the present physical appearance of the property, including condition, boundaries, surroundings, and (if appropriate) architectural style.

This unit consists of three individual furnace structures, each with brick encased furnaces set beneath open steel frames topped by corrugated iron gable roofs. These furnaces lead to a common large concrete stack, which is approximately 12' in diameter and rises to a height of approx. 150'. Behind the furnace structures are several metal clad columns (aromatic recovery stills), as well as a complex array of piping and other superstructural details. The unit in deteriorated condition, being partly dismantled (piles of removed hardware in vicinity), and all of its exposed metal is well rusted. The A.R.U. is located in the midst of the main industrial area of the refinery.

8. Alterations & Date partially dismantled, 1980's
9. Related Features on Property oil refining facilities, storage tanks, administrative bldgs., roads



10. Planning Agency
City of Richmond Planning Dept.
11. Owner & Address
_____
_____
_____
_____
12. Type of Ownership private
13. Present Use abandoned
14. Zoning M-3
15. Threats demolition

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State of California - The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
OFFICE OF HISTORIC PRESERVATION

HISTORIC RESOURCES INVENTORY

IDENTIFICATION AND LOCATION

Ser. No. ____ - ____ - ____
National Register Status 6Z1
Local Designation ____

1. Historic Name unknown
2. Common or Current Name No. 11 Battery
3. Number & Street Southeast corner of Midway and Division Streets, Chevron Refinery Cross-Corridor ____
   City Richmond Vicinity Only ___ ZIP ____ County (3-Letter Designator) ____
4. UTM Zone ___ A ____ B ____ C ____ D ____
5. Quad Map No. 466B Parcel No. ____ Other ____

DESCRIPTION

6. Property Category structure If District, Number of Documented Resources 7
7. Briefly describe the present physical appearance of the property, including condition, boundaries, surroundings, and (if appropriate) architectural style.

This unit is a complex of related features involved in the crude oil distillation process. It includes two tandem processing units, each comprised of a two story height brick enclosed furnace sheltered from the weather by a steel framework supporting a corrugated iron gable roof. In the rear of each furnace are two columns, one atmospheric column, and one vacuum column, which are approx. 12' in diameter and rise to a height of approx. 150'. A catwalk spans the distance between the two sets of two columns. In addition to the two furnace structures and four columns, are two large diameter stacks, one for each furnace. The stacks are located in front of each furnace, and are identical in design. These structures, now heavily rusted, were constructed in bolted sections, and are approx. 200' in height. Numerous pipes lead from No. 11 Battery to the Midway Street elevated pipeway.

8. Alterations & Date unknown

9. Related Features on Property oil refining facilities, storage tanks, administrative bldgs., roads

10. Planning Agency
City of Richmond Planning Dept.

11. Owner & Address
____
____
____
____

12. Type of Ownership private

13. Present Use active refinery unit

14. Zoning M-3

15. Threats proposed replacement

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