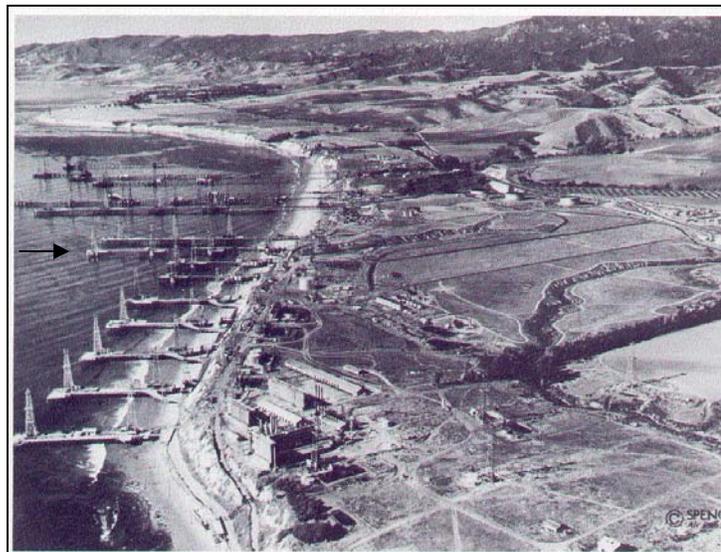


## PRC-421 Pier Removal Project – Bird Island

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The PRC-421 oil and gas lease is located offshore, southeast of the Ellwood Pier across from the Sandpiper Golf Course near the city of Goleta, Santa Barbara County, California. The PRC-421 lease area is within the Ellwood Oilfield Complex (Figure 1), which began onshore in 1928 and over subsequent years resulted in many offshore piers, some extending up to 549 meters (1,800 feet) in length (San Buenaventura Research Associates 1997). The original PRC-421 lease was issued in 1929 and by 1938, the lessee had constructed three piers for drilling, development, and production of the oil and gas reserves. By the 1950s, the wells were abandoned and permanently plugged, in accordance with the then existing California Division of Oil and Gas procedures, with most of the pier structures removed, except the remnant pier-head left remaining offshore disconnected from shoreline access around 1956. Over the years, the ocean and winter storms have continually battered the structure, causing one of the eight caissons to collapse and creating an offshore public safety risk from falling debris or catastrophic failure.

Figure 1. Ellwood Oil Field Complex, Santa Barbara County, California (Circa 1938). Arrow identifies the historic pier.



In its 75-year history of PRC-421, the California State Lands Commission (CSLC) has reassigned the lease many times with the last and current assignment to Venoco, Inc. in 1997. In 1993, ARCO had assumed responsibility for the abandonment and cleanup of PRC-421 through the South Ellwood

Transfer Agreement with Mobil Corporation. By 2000, ARCO had prepared a plan for complete removal of the structure and all remaining debris associated with the previous pier. ARCO submitted the removal plan to the CSLC for approval, where the CSLC, as lead agency under the California Environmental Quality Act (CEQA), prepared and circulated a Draft Environmental Impact Report (DEIR) on the proposed plan in 2002.

During the circulation of the Draft EIR, the California Department of Fish and Game (CDFG) submitted comments that stressed the importance of the existing structure for seabirds. Because of an “island” effect of the remnant pier-head, which provides protection from predators and human disturbance, the structure has become an important roosting and nesting site for local marine birds, hence the name “Bird Island” (Figure 2). Most notably, the structure has been determined by the CDFG to rank 12<sup>th</sup> out of the 60 mainland diurnal roosts sites known for brown pelicans from Point Conception to the Mexican border and is the only nocturnal roost site along 120 kilometers (75 miles) of the southern California coastline. The site is also the only known nesting site for Brandt’s cormorant on the mainland coast south of Point Conception. Strong (2002) found the site occupied by brown pelicans ranging from a dozen to 160 individuals and McChesney et al. (1998) documented 68 Brandt’s cormorants and 37 nests on the structure in 1997. Surveys conducted in 2001 found more than 100 cormorants and brown pelicans occupying the structure with several cormorants nesting during the breeding season.

Figure 2. Remnant PRC-421 Pier with Roosting Seabirds.



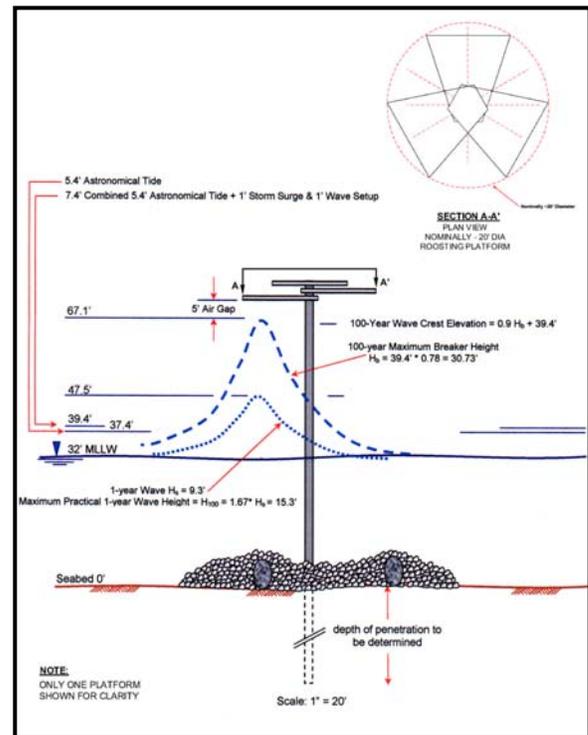
In response to the CDFG’s concern, the CSLC, ARCO, environmental and engineering consultants, and CDFG biologists began exploring solutions to the seabird issue. As a result of these collaborative discussions, the project was revised to provide an arrangement of four piles that will support individual

roosting/nesting platforms to replace the existing, debilitated structure. It was also proposed that the remaining concrete caissons be toppled in-place to form the core of an artificial reef, supplemented with quarry rock providing additional structural support of the platform piles. Removal of all other portions of the remnant pier, such as pier decking, steel trusses, inshore debris from the previous causeway, etc., as proposed in the original project will remain as part of the revised project. ARCO agreed to proceed with the revised project scope after obtaining support from the CSLC, CDFG, and California Coastal Commission (CCC) even though the costs were approximately 10% more than the costs of the original removal project.

The first priority of the revised project, as with the original project, is the removal of the pier structure and all associated remnant debris on the seafloor as required by the CSLC's abandonment and cleanup procedures. Once the wooden and steel decking is removed from the remnant structure, the concrete caissons will be toppled in place using shaped explosives. The toppled concrete caissons, determined to be suitable hard substrate material for marine organisms, e.g., kelp, will remain at the site and supplemented with quarry rock to increase the habitat diversity of the hard bottom substrate design. This design was reviewed and approved by CDFG biologists and is consistent with CDFG guidelines for creating artificial reefs. The area of the hard bottom substrate will encompass approximately 0.2 hectare (0.5 acre) of the seafloor.

The design of the platforms will approximately equal the roosting/nesting area that is currently available on the remnant structure. Generally, roosting/nesting areas of the existing structure consist of exposed wooden joists, several steel beams, and one nearly intact section of decking all totaling approximately 244 square meters (800 square feet). The platforms will consist of a diamond-plated surface and will be slightly sloped to discourage water ponding during the winter. The CDFG biologists and marine bird specialists from CDFG Office of Spill Prevention and Response (OSPR) reviewed the platform design and spatial arrangement and the present design incorporates all of their recommendations.

Figure 3. Roosting/Nesting Platform Design



Four pipe piles will be driven into the seafloor, each supporting three trapezoidal roosting/nesting platforms in offset positions at slightly different elevations (Figure 3). The design of steel pipe, plates and shapes will conform to applicable sections of the American Institute of Steel Construction (AISC) Steel Construction Manual and American Petroleum Institute (API) RP-2A documents. The steel will also be of a grade appropriate for the predicted environmental and installation stresses. Additionally, the engineering design will investigate the piles for vortex shedding and ability to withstand a seismic event.

The original design criteria for the PRC-421 pier structure in the 1930s are not known; however, recent studies in the project area indicate that the 100-year storm wave overtops the existing remnant structure, which has likely resulted in its debilitated condition over the years. The engineering design of the platforms, therefore, considers the 100-year storm wave conditions ensuring that the elevation of the platforms be above the predicted 100-year wave crest elevation (Figure 3). This will result in an elevation of the new platforms to be approximately 3-5 meters (10-17 feet) higher than the existing pier decking elevation.

The design of the piles and platforms also applies a system of preservative products to reduce the maintenance of the pile structures. Typically, offshore structures experience their worst corrosion in the “splash-zone”, which is defined as the area that experiences the rise and fall of tides as well as the periodic wetting due to wave action. To eliminate the aggressive corrosion effects of the seawater in the splash-zone, protective wrap (DENSO brand protective products) will be applied to the piles. The protective wrap is a two-part wrap product consisting of paste-impregnated cloth tape that is covered with a bolt-on polyethylene UV-resistant cover. The outer polyethylene cover also resists the attachment of marine organisms, such as mussels and limpets. That portion of the pile mostly above the splash-zone and the roosting/nesting platform structures will be coated with white, high-build epoxy paint, which shows excellent resistance to seawater and marine environments. For that portion of the pile below the protective wrap and above the seabed, sacrificial aluminum alloy anodes will be used to protect the submerged portion of the bare steel from corrosion.

The precise position of the four piles will be determined after the disposition of the toppled concrete caissons. However, the intended locations will be to the nearshore side of the toppled caissons, in-line or in a slight arc, allowing rock barge access from the offshore side. The positioning of the piles will also be arranged to ensure future access to the interior well conductor as necessary for any future maintenance or repairs. Figure 4 provides a view of the existing remnant structure in comparison to a photo-simulation of the proposed roosting/nesting platforms from the same view.

Figure 4. Existing Structure and Photo-Simulation of the Proposed Roosting/Nesting Platforms.



As with the original project, the CSLC prepared and circulated a Draft and Final EIR on the revised project in early 2004 and the revised project was approved by the CSLC in June 2004. At the same time, the CSLC also approved a new lease (49 years) to the CDFG for the surface area of PRC-421 that will be occupied by the hard bottom substrate and seabird platforms. Implementation of the project is scheduled for the fall of 2005 pending receipt of all other necessary permits. The CSLC and CDFG are currently reviewing proposals for seabird monitoring of the platforms and kelp enhancement of the hard bottom substrate by local non-profit groups, including Santa Barbara Audubon Society and Santa Barbara Channelkeepers. Funding for the monitoring and enhancement will be provided through environmental funds offered up by ARCO. Monitoring of the

site will be important to assist the involved agencies on the success of the project and the long-term management of the site.

Funding for future maintenance of the structures has been set aside for the life of the CDFG lease. The projected cost, considering an inflation rate of 4%, is \$210,000. Maintenance activities are not continuous, but occur at set points in the life of the structures, the first occurring in year eight following installation. Funding for such costs will be provided by ARCO to an interest bearing account designated and controlled by the CDFG in consideration of a sharing, between the CDFG and ARCO, of the construction costs of the hard bottom substrate. Based on consultations with CCC staff, the reef will be eligible for funding from the Hard Bottom Fund established by the CCC.

This project has provided an opportunity to develop a unique solution for an aging, oil and gas facility. The site has been an abandoned facility for 50 years and the disposition of the remnant pier-head provides critical roosting for the endangered California brown pelican and nesting for the Brandt's cormorant. Planning for the project has been a highly collaborative effort between ARCO, CSLC, CDFG, and CCC and has support from NOAA Fisheries (National Marine Fisheries Service), Santa Barbara Audubon Society, and United Anglers. Working in this collaborative effort has provided a positive solution to protect and enhance local biological resources at the same time absolves an oil company's responsibility by having an aging, debilitated oil and gas facility removed and cleaned up.

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