

Meeting Date: 04/02/25

Lease Numbers: 1824

3150

Staff: J. Fabel

N. Dobroski

Staff Report 50 (Informational)

DISCUSSION:

SUMMARY ISSUE

On March 3, 2025, Commission staff formally released to the public a report titled [“Review of Lease Obligations and Assessment of Impacts to Public Trust Resources and Values: State Oil and Gas Leases PRC 1824 and PRC 3150 Terminations and 4H Shell Mounds Disposition”](#) (the Assessment). The Assessment was developed in response to an application by Chevron U.S.A. Inc., (Chevron) to negotiate the termination of two remaining oil and gas leases in the Santa Barbara Channel of the Pacific Ocean (Leases 1824 and 3150). Chevron believes that stipulations placed by the Commission as part of a 1994 approval for Chevron to remove four offshore oil and gas platforms (Hazel, Hilda, Heidi, and Hope, collectively the 4H Platforms)¹ have been met and now seeks an agreement to leave four “shell mounds” underlying the former 4H Platform sites, and one remnant caisson from platform Hazel, in place (the Shell Mounds). The Assessment analyzes 23 separate studies performed over 40 years at the Shell Mounds sites to explore the potential impacts to public trust and natural resources from leaving the Shell Mounds in place. The Assessment also includes an abbreviated assessment of potential impacts that could be caused by their full removal. The purpose of the Assessment is to provide transparency to stakeholders, tribal nations, and decision makers about areas of concern to address should the Commission approve a future agreement to terminate the 4H Platform Leases.

¹ The Hope and Heidi shell mounds lay within the bounds of a legislative grant to Santa Barbara County, with minerals reserved to the state.

BACKGROUND

THE 4H PLATFORMS

In 1957, the Commission issued State Oil and Gas Lease PRC 1824 to Standard Oil (now Chevron) and Humble Oil (now ExxonMobil). In 1964, it issued Lease PRC 3150 to Richfield Oil (later ARCO, now BP) and Standard Oil. These leases supported oil and gas production from the 4H Platforms installed offshore Santa Barbara County between 1958 and 1965. Although the platforms were jointly owned, Chevron took primary responsibility for their removal.

In 1994, the Commission approved a project ([Item 54, August 3, 1994](#)) by Chevron to abandon and remove the 4H Platforms. The project, as approved, contemplated that Chevron would leave the shell mounds under each platform in place, and the supporting Mitigated Negative Declaration (MND) identified no significant impacts or need to mitigate for leaving the shell mounds. However, the Commission added stipulations to its approval requiring Chevron to take measures to ensure the shell mounds did not cause conflicts with local commercial trawlers and that commercial trawlers would benefit from expanded fishing at the former platform locations (i.e., stipulations 5 and 7 to the Project).

WHAT ARE SHELL MOUNDS?

During early well drilling and production at the 4H Platforms, oil-based and water-based drill muds² were used during drilling and were discharged with clean drill cuttings to accumulate on the seafloor beneath each platform. From 1955 through 1969, the Commission permitted oil companies to discharge cleaned drill cuttings and water-based drilling muds into state waters from platforms and mobile drilling facilities operating on state tide and submerged lands oil and gas leases. Drilling muds used at the time were likely to contain contaminants such as polychlorinated biphenyls (PCBs), metals, polycyclic aromatic hydrocarbons (PAHs), and hydrocarbons. These muds formed a pile underneath each platform. Over time, encrusting invertebrates such as mussels and barnacles fell from the platform support surfaces and accumulated on the substrata overlaying the drilling muds creating a solid “shell hash” that is 1-7 feet thick.

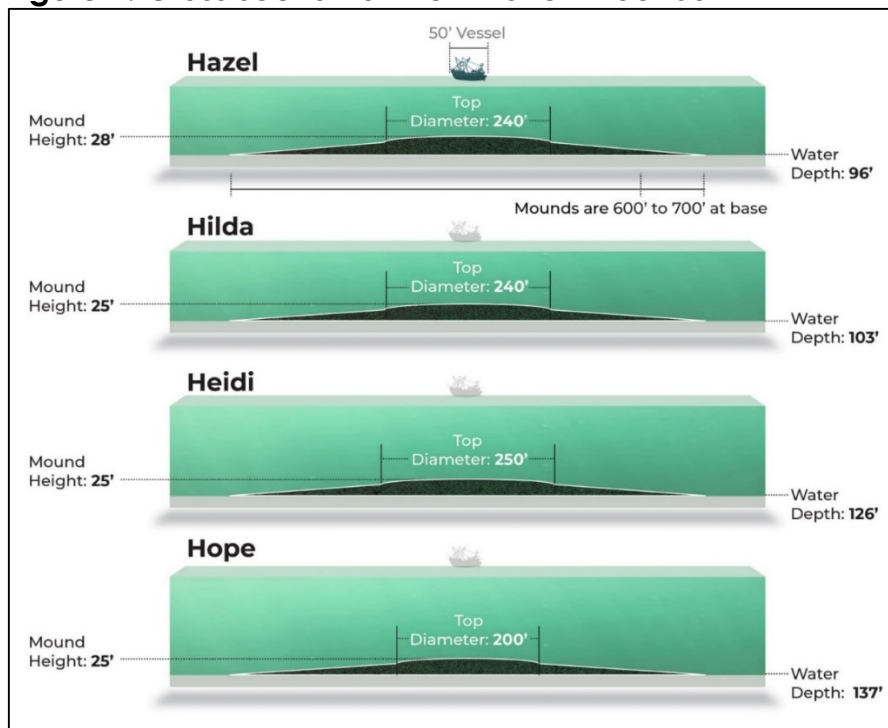
² Drilling muds, also known as drilling fluids, are essential in oil and gas drilling, serving to suspend and remove rock cuttings, lubricate and cool the drill bit, and maintain wellbore stability.

4H PLATFORM REMOVAL AND CONFLICTS WITH COMMERCIAL FISHERIES

Chevron removed the 4H Platforms in 1996, and consistent with the 1994 MND, the subsea “shell mounds,” consisting of empty mussel shells, sediment, and an inner layer containing drill muds and cuttings, remained (see Figure 1, below).

Additionally, the Commission approved partial abandonment of platform footings that were inextricably intermingled with the shell mounds. At Platforms Hilda, Hope, and Heidi, the platform support structures were cut below the seafloor surface; however, at Platform Hazel, a different type of support caisson was used during construction, and the platform support caissons were cut above the seafloor, leaving a portion of the four concrete caissons extending from 3 to 12 feet above the shell mound. Following platform removal, Chevron further removed the majority of remnant oil rig debris.

Figure 1. Cross section of the 4H Shell Mounds



Chevron performed trawl tests over the shell mounds in 1996 and 1997,³ but these tests failed when trawl netting and equipment snagged on portions of each shell

³ These tests were in connection with Project stipulation 5, under which: “Chevron shall submit a ‘trawl plan’ (Plan) to the SLC for its approval. Such Plan shall provide for test trawls over the debris clearance area at each platform location. . . . Such

mound. Chevron, pursuant to directives by the Commission and in coordination with the Joint Oil/Fisheries Liaison Office, worked to address commercial trawlers' claims that the shell mounds unduly interfered with California halibut and sea cucumber fishing operations, causing economic harm from damaged or destroyed fishing nets, lost time, lost catches, and/or preclusion from fishing in one or more of the 4H shell mound areas.

COMMISSION ACTIONS TO ADDRESS FISHERIES CONFLICT AND EXECUTION OF THE TRAWLER AGREEMENTS

In December 1999 ([Item 75, December 3, 1999](#)) staff reported on the status of the interim commercial fishing measures. At this meeting, the Commission received comments that the only way to resolve the fisheries conflict was to remove the mounds. Other commenters stated that the cost of removing the mounds should be used to rehabilitate and enhance California halibut habitat in coastal estuaries.

Commercial trawlers also voiced concerns about the reliability of marker buoys placed by Chevron at the shell mound sites. The Commission discussed the issue of compensation to fishermen whose equipment was damaged on the mounds and requested information on the appropriateness of requiring Chevron to provide equipment with differential global positioning system (DGPS) technology to trawlers who operated in the shell mound vicinity. The Commission subsequently directed Chevron to take the following measures:

- Maintain marker buoys at each shell mound for commercial trawlers to avoid the mounds.
- Enter into contracts for inspection of the buoys at least twice monthly.
- Act on all claims for damages claimed to be caused by the shell mounds within one month of receipt or such additional time as the claimant and Chevron shall jointly agree to, and:
 - Notify staff in writing upon receipt of shell-mound-related damage claims.
 - Engage a qualified and experienced third party to visually inspect the damaged equipment before any claim is denied.

Plan shall also provide for the use of conventional trawling gear, i.e., gear without modifications that would allow it to clear seafloor obstructions, comparable to that which would be used by commercial fishermen in the region. . . . Chevron shall proceed with the test trawls . . . and shall notify the SLC upon the successful conclusion of the trawls."

- Implement mediation procedures subject to review and approval by the Commission's Executive Officer for all claims denied by Chevron.
- Purchase and install a DGPS system in the vessels of trawlers who had fished in the Santa Barbara offshore waters for at least 1 year.

Chevron also agreed to prepare a technical report to assess the feasibility of shell mound removal and evaluate the potential short- and long-term environmental impacts of mound removal as compared to in-place abandonment. The technical report (de Wit 2001⁴) suggested it would be feasible to remove the mounds using a clamshell bucket dredge or by trawling using a dragline dredge, although either method would result in resuspension of contaminated sediments in the water column. California Coastal Commission staff briefed the Coastal Commission in April 2001 ([Item 5a](#)) on the findings of that report, and at a June 2001 hearing ([Item 11b](#)), the Coastal Commission voted unanimously to require that Chevron file an application to amend its Coastal Development Permit to provide for the removal of all shell mounds.

The de Wit (2001) report also prompted the State Lands Commission to initiate preparation of a Draft Program Environmental Impact Report (EIR)/Environmental Assessment (EA) to evaluate other options, such as full mound removal or a pilot project of partial removal. A draft Program EIR/EA was developed and released by the Commission in 2003 eliciting over 600 comments. Significant differences developed over what should be done to the shell mounds to eliminate the fisheries conflicts. Based on the public comments, an unreleased second Administrative Draft EIR was developed in 2009 with seven alternatives to offset impacts to commercial fisheries and the local Santa Barbara commercial fishing industry.⁵ Two agencies, the U.S. Army Corps of Engineers and the Central Coast Regional Water Quality Control Board, opposed full shell mound removal due to the risk of suspending contaminants within the mounds into the water column through the process of clamshell dredging. The draft EIR/EA was never finalized due to the

⁴ de Wit, L.A. 2001. Shell Mounds Environmental Review Volume I Final Technical Report. March 2001. Prepared for the California State Lands Commission and California Coastal Commission. Concord, California: de Wit. Available upon request from California State Lands Commission.

⁵ The 2009 ADEIR assessed seven alternatives ranging from partial removal, placing artificial reefs on the mounds locations, offsite mitigation, shell mound capping, full removal, commercial fisheries compensation as mitigation, and no project.

divergence on a suitable approach to resolving the conflict with commercial fisheries.

In June 2013, Chevron reached settlement with individual commercial trawlers, facilitated by the Fisheries Liaison Office, to purchase upgraded navigation systems that allow trawlers to avoid the 4H shell mounds and prevent damage to their trawling equipment and compensate each for the past and future loss of use over the Shell Mound sites. Chevron paid or reimbursed any trawler who had already incurred such costs, \$40,000 per trawler (Trawler Agreements). Sixteen commercial trawlers who met agreed-upon eligibility requirements entered into the Trawler Agreements with Chevron, and a 17th trawler signed on in 2014. No additional trawlers have notified the Liaison Office, Chevron, or staff of their potential eligibility and as of January 2025, the Liaison Office is unaware of any reported fisheries conflict with the Shell Mounds since execution of the Trawler Agreements. As part of the Trawler Agreements, the trawlers agreed to release the state and Santa Barbara County from all liability relating to the shell mounds.

CHEVRON SEEKS A FINAL DISPOSITION TO THE SHELL MOUNDS

On November 2, 2021, Chevron applied to the Commission for consideration of a final disposition to the 4H Shell Mounds that allows them to remain in place, pursuant to an agreement on future monitoring and other measures. Chevron submits that the Trawler Agreements address both the directives of the Commission and the underlying concerns that formed the basis for Stipulation No. 5, namely that the Trawler Agreements permanently resolve the conflicts between the Shell Mounds and Commercial Trawlers and adequately compensate them for the loss of trawling grounds at the Shell Mounds.

To assess and inform staff on Chevron's request, the state of the Shell Mounds and their potential impacts, both of remaining in place, and potential removal, staff developed the Assessment and organized additional studies, including geophysical surveys, ROV site surveys, and a mussel bag study.⁶

THE ASSESSMENT

The Assessment synthesizes 23 studies performed at the 4H Platform sites since 1964, including biological, geological, and soil surveys of the Shell Mounds, and includes

⁶ Chevron funded this additional work under a Reimbursement Agreement. Most work was conducted by the Commission's consultant, Dudek.

a review of relevant scientific literature. The Assessment is not intended as an equivilant analysis as would be performed under the California Environmental Quality Act, but as a document to inform stakeholders, tribal nations, and decision makers on the potential impacts to public trust resources if the Shell Mounds were to be left in place and to inform staff and the Commission about areas of concern when negotiating with Chevron on terms of a final Lease Termination Agreement.

A draft of the Assessment was independently peer reviewed by impartial scientists coordinated by the Ocean Science Trust (OST) in 2022. A summary report of the peer review outcomes can be found at [OST's website](#) and further discussion is found in the Assessment. In response to the peer review, staff undertook a new mussel bag study to assess contaminant dispersal in the water column overlying the mounds and updated the Assessment with those results.

SUMMARY OF ASSESSMENT RESULTS

Notable findings of the Assessment include the following:

- Physical stability of the mounds has been demonstrated through geophysical surveys in 1996, 1999, 2004, 2009, and 2021, as well as ROV surveys (most recently in 2022, Appendix C3) that showed **no evidence of slope failure** despite repeated physical disturbance of the shell mounds by platform removal activities, including explosive cutting of platform pilings and platform jacket removal, two trawl test events, placement of temporary marker buoys, two debris removal events, two vibrocore surveys, and minor earthquakes.
- Although analysis of sediment cores from the shell mounds and prior sampling show some trace contaminants, **high sedimentation** associated with the region **continues to entomb the mounds** and the remnants of those contaminants.
- Surficial bottom sediments near the shell mounds contained elevated barium concentrations that were likely derived from drilling waste, but site studies in 2006 concluded that chemical contaminants are **not being remobilized from the shell mounds**, and that without a large physical disturbance, the contaminants within the shell mounds **will likely remain sequestered**.
- Some contaminants detected in studies of the Shell Mounds, such as heptachlor epoxide, are **not associated with oil and gas development** and likely originated from other point or area sources not associated with the Shell Mounds.
- The lack of contaminant dispersal from the mounds to the overlying water column is supported by studies conducted of the mounds' profiles using a **remotely operated vehicle** in 2022 (Appendix C3) and a **mussel bag study conducted in 2023** (Appendix C2). In particular, the mussel bag study in 2023

was compared to a similar study at the mounds in 2003 and showed **no apparent trends in contaminant accumulation** in the tissues of mussels exposed at the mounds, and no **significant difference from shallow and deep reference sites** that were used for comparison.

- Invertebrates collected at the shell mounds found **no change in accumulation of metals** in 2013 versus samples collected in 2002.
- Mussels deployed at the shell mounds in 2003 and 2023 remained healthy through an approximately 2-month exposure, even showing **significantly faster growth at some of the shell mounds** compared to reference sites (SAIC 2003a; Appendix C2).
- Resident organisms at the mounds, such as bat stars, sea cucumbers, and rock crabs, are **not prey species for higher-trophic-level organisms**, such as marine mammals and sharks, which limits the potential for bioaccumulation of contaminants that may be present.

The alternative to retaining the shell mounds in their current condition is to remove them via dredging and dispose of them at an offshore or onshore location. However, disturbing the mound sediments would introduce contaminants into the water column. Therefore, in addition to the Assessment, for purposes of comparison, a preliminary analysis document was prepared discussing impacts that would be associated with shell mound removal. A summary of comparative findings are attached to this staff report as Exhibit B.

GEOLOGIC AND SEISMIC HAZARDS

Of all the issue areas analyzed concerning abandoning the shell mounds in place, only those associated with seismic effects were identified as posing potentially moderate risk. The U.S. Geological Survey Working Group on California Earthquake Probabilities assessed the likelihood of large-magnitude earthquakes across California, estimating a 93 percent probability of a magnitude 6.7 or larger quake in Southern California between 2014 and 2043.⁷ The probability of a magnitude 6.7 or larger quake occurring on offshore faults within 10 miles of the 4H shell mounds is

⁷ Based on U.S. Geological Survey data (USGS 2022) assessed by Fugro, no large earthquakes M 6.0 or larger have been recorded within 10 miles of the 4H shell mounds (records available from 1860 to 2022). However, a 1925 event that had an uncertain epicenter (Santa Barbara vicinity, offshore, or possibly onshore on the More Ranch or Mesa Fault; M 6.8) may have fallen within the 10-mile radius of the 4H shell mounds.

approximately 10 percent, while the probability of an magnitude 6.0 or larger quake is 23 percent. Several active faults, including the Ventura-Pitas Point-North Channel Fault system and the Santa Ynez Fault, contribute to the potential for strong ground shaking at the 4H shell mounds. These mounds, composed of shell hash, drilling mud, and rock cuttings, rest on native clay sediments, making them susceptible to seismic activity that could lead to slope failure, cracks, and liquefaction, potentially exposing drilling waste at the surface.

Despite seismic risks, geophysical surveys conducted from 1996 to 2022 indicate that the Shell Mounds have remained stable since platform removals in 1996. Bathymetric data show that the mounds' topography has remained consistent despite disturbances from platform removal activities, trawl tests, debris removal, and minor earthquakes. While depressions and pockmarks from past platform removal are present, no signs of slope failure or exposure of drilling waste have been observed. The most recent ROV surveys in 2022 confirm continued stability, suggesting that, so far, the mounds have withstood natural and man-made disturbances without significant structural compromise.

A 2004 Fugro study⁸ evaluated the seismic stability of the 4H shell mounds, analyzing four different scenarios involving earthquakes of magnitude 6.0 and 6.5⁹ at varying distances. The study found that moderate earthquakes could cause minor settling, while larger quakes nearby could result in several feet of displacement, with non-uniform deformation due to the mounds' inconsistent composition. Seismic shaking could also trigger localized slope failures, potentially exposing underlying drilling waste as the shell hash layer shifts downslope. A 2022 Fugro analysis expanded on this by modeling a broader range of earthquake magnitudes (M 6.0–7.5) and distances (0.5–10 miles), finding that closer, smaller earthquakes could cause similar displacements to more distant, larger quakes. The highest predicted displacement—2.3 feet—could occur with a magnitude 7.5 event within 0.3 miles of

⁸ Fugro. 2004. Evaluation of Seismic Stability, "Shell Mounds" at former Platform Hazel, Heidi, Hilda, and Hope Sites, Santa Barbara Channel, Offshore California. Prepared by Fugro West Inc. for Padre Associates. February 12, 2004. Available upon request from California State Lands Commission.

⁹ Measured at Moment Magnitude Scale which measures the total energy released, suitable for all earthquake sizes, especially large ones.

the mounds, while even a magnitude 6.0 event at that distance could cause 8 inches of displacement.¹⁰

Although the annual probability of a magnitude 6.0 or greater earthquake affecting the mounds is relatively low (0.8 percent to 1.0 percent), the long-term likelihood of exposure to seismic activity over 30 to 100 years is estimated at 25 percent to 80 percent. If a strong earthquake were to cause slope failure, contaminant release could negatively impact marine water quality and ecosystems. The 2004 Fugro study estimated that a magnitude 6.5 earthquake could result in varying levels of surface exposure: 10 percent from lateral displacements, 20 percent from liquefaction and lateral spreading, and up to 50 percent from a debris flow. While precise predictions are difficult, the potential for ground shaking to compromise the integrity of the shell mounds remains a concern, with possible consequences including slumping, settlement, and rupture of the mound structures.

This potential risk informs staff's discussions with Chevron. Staff anticipate any final Lease Termination Agreement to include a period of monitoring and, in the event of a seismic event that triggers movement in the shell mounds, a response and containment procedure by Chevron.

NEXT STEPS

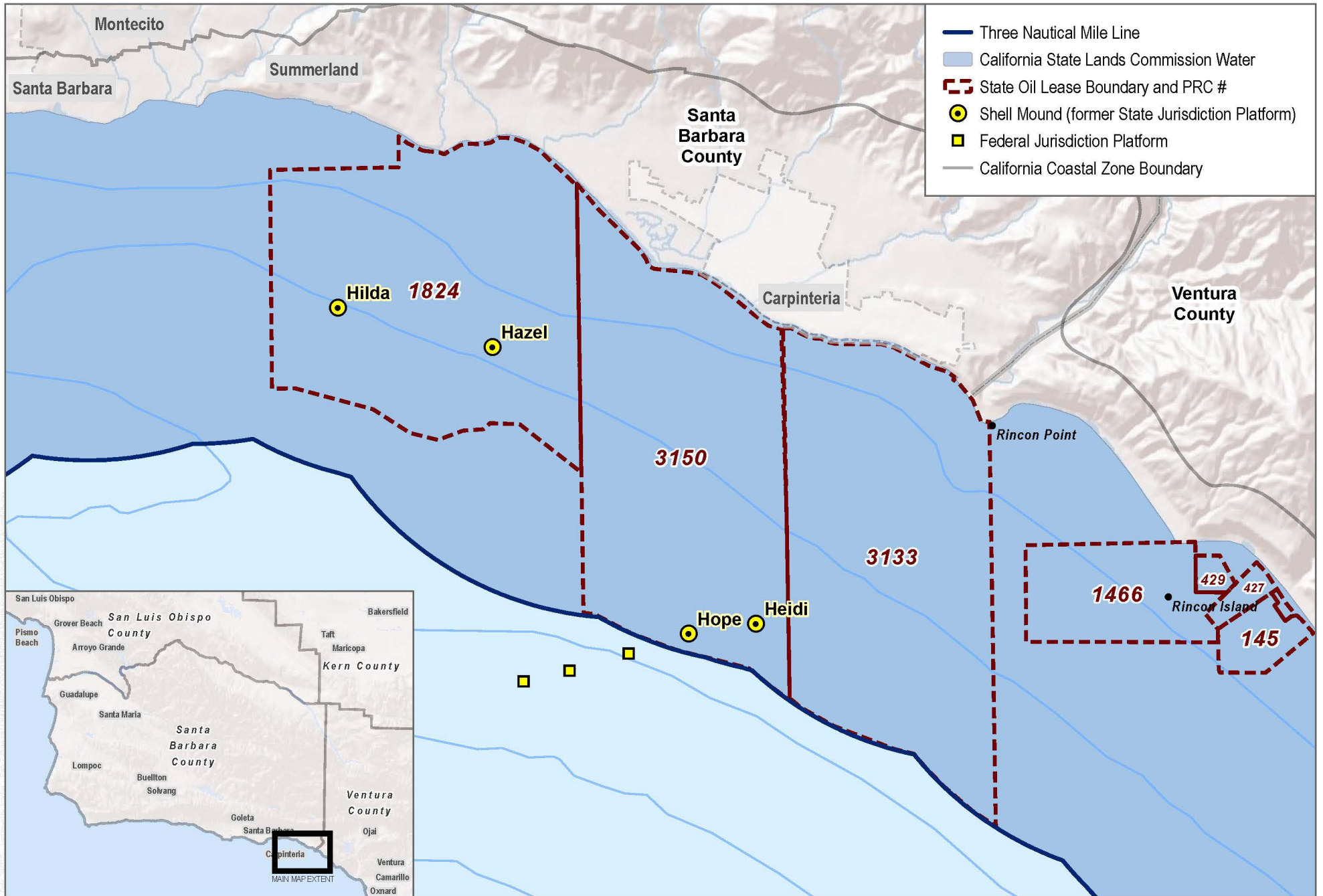
Staff are accepting comments on the Assessment through April 30, 2025, and will continue to negotiate terms of a Lease Termination Agreement with Chevron based on the findings in the Assessment. Staff anticipate presenting a proposed agreement along with a summation of comments received in connection with the Assessment at a later Commission meeting in 2025.

EXHIBITS:

- A. Map of 4H Platform Locations
- B. Summary of Assessment Findings

¹⁰ Fugro, 2022. Update of Geotechnical Evaluations and Findings in Fugro (2004) Stability and Seismic Displacement of Shell Mound Materials Platforms Hazel, Heidi, Hilda, and Hope, Santa Barbara County, California Fugro Project No. 04.00213509. Available upon request from the California State Lands Commission.

Exhibit A



SOURCE: County of Santa Barbara

FIGURE 1-1

Lease and Shell Mound Locations

Exhibit B

Table ES- 1. Summary of Assessment Findings

Issue Area/Effect	Intensity of Effect	
	Mounds Left in Place	Mounds Fully Removed Through Dredging (Effects During or After Removal)
Commercial Fishing		
Adversely affect commercial fisheries due to contaminant exposure	Low, unless major disturbance occurs	Potentially high
Adversely affect commercial fisheries due to presence of mounds preventing trawling or interfering with various gear types	Low, trawler agreements limit risk	None
Marine Water Quality		
Adversely affect marine water quality due to mound contaminants	Low	Potentially high
Marine Biological Resources		
Adversely affect the marine invertebrates and fishes inhabiting the 4H shell mounds	Low	Potentially high
Geologic and Seismic Hazards		
Release embedded contaminants due to a shift or collapse of the 4H shell mounds	Potentially moderate	Low
Recreation, Public Access, and Land Use		
Adversely affect public access or recreational use of the area where the 4H shell mounds are located	None	None
Air Quality and Greenhouse Gases		
Result in emissions of air quality pollutants and/or greenhouse gases that exceed applicable thresholds	None	Potentially major

Exhibit B

Issue Area/Effect	Intensity of Effect	
	Mounds Left in Place	Mounds Fully Removed Through Dredging (Effects During or After Removal)
Coastal Processes and Sea Level Rise		
Cause changes in littoral transport, wave action, or other processes	None	None
Influence or be affected by projected sea level rise	None	None
Cultural and Paleontological Resources		
Disturb or damage cultural or paleontological resources in the vicinity of the 4H shell mounds	None	None
Environmental Justice		
Cause disproportionate impacts to minority or low-income populations in regional port communities	Low	Potentially major
Navigation, Transportation, and Traffic		
Interfere with offshore navigation, transportation, or traffic	None	Potentially moderate
Increase vehicle miles traveled and/or reduce level of service at intersections onshore	None	Potentially major
Noise		
Generate noise that exceeds applicable thresholds or that creates a public nuisance	None	Low
Public Safety and Hazards		
Create a hazard or otherwise adversely affect human safety	Low	Low

Exhibit B

Issue Area/Effect	Intensity of Effect	
	Mounds Left in	Mounds Fully
Scenic Resources		
Adversely affect a scenic viewshed or other scenic resource	None	Low