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California Outer Continental Shelf Platform Decommissioning Update, Outlook, and Challenges

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Abstract

The authors have been working with the challenges related to decommissioning facilities offshore California since 1996. In a 2018 OTC paper (OTC-28844-MS) they reviewed the challenges for offshore facility decommissioning in this region. This paper reviews and updates the oil and gas platform decommissioning projects being conducted on the federal Outer Continental Shelf (OCS) offshore California and the decommissioning outlook for OCS platforms through the end of this decade. There are a total of 23 oil and gas platforms on the federal OCS offshore California which are submerged lands located more than three nautical miles from the coastline. The authors project that one-third of the 23 OCS platforms and one state water platform are likely to be decommissioned by the end of the decade, and at least 50 percent of the OCS platforms are likely to be removed by the middle of the next decade. Three of the eight OCS platforms being decommissioned, if fully removed, would each establish world water depth records for removing conventional steel platform jackets from the seafloor. The paper also describes the major technical, logistical, environmental, and regulatory challenges operators face in planning and conducting decommissioning projects offshore California.

Objective, Scope

The objective of this paper is to describe the OCS and state waters oil and gas platform decommissioning projects being conducted offshore California, and the outlook for decommissioning OCS platforms through 2030 and the middle of the next decade. The scope of the paper covers the operational status of the 23 California OCS platforms, discusses ongoing and upcoming platform decommissioning projects, and briefly highlights the major technical, logistical, environmental, and regulatory challenges that complicate the platform decommissioning and removal process.

Methods, Procedures

This paper compiles information on platform decommissioning projects obtained from public sources and the U.S. Department of the Interior's Bureau of Safety and Environmental Enforcement (BSEE) and Bureau of Ocean Energy Management (BOEM). Information on the technical and logistical challenges of

decommissioning was obtained from technical studies conducted by TSB Offshore, Inc., and various journal articles.

California OCS Platforms

There are 23 oil and gas platforms located on the federal OCS offshore California, which are submerged lands located more than three nautical miles from the coastline (Fig. 1). All the OCS platforms are located within 10 miles of the coastline. The majority (19) of the 23 federal platforms are in the Santa Barbara Channel and Santa Maria Basin offshore Ventura County and Santa Barbara County; four of the OCS platforms are in San Pedro Bay offshore Los Angeles County. The platforms are in water depths ranging from 95 to 1,198 feet, and range in size from small structures like Gina having a total weight of 1,400 tons, to ultra-large structures like Heritage and Harmony having estimated removal weights ranging from 69,000 to 87,000 tons (TSB Offshore, Inc., 2016). All the platforms exceed 30 years in age and 14 range in age from 40 to 55 years, which exceeds the typical 25 to 30-year original design life for most platforms. Many of the platforms have either ceased production or are nearing the end of their economic life.

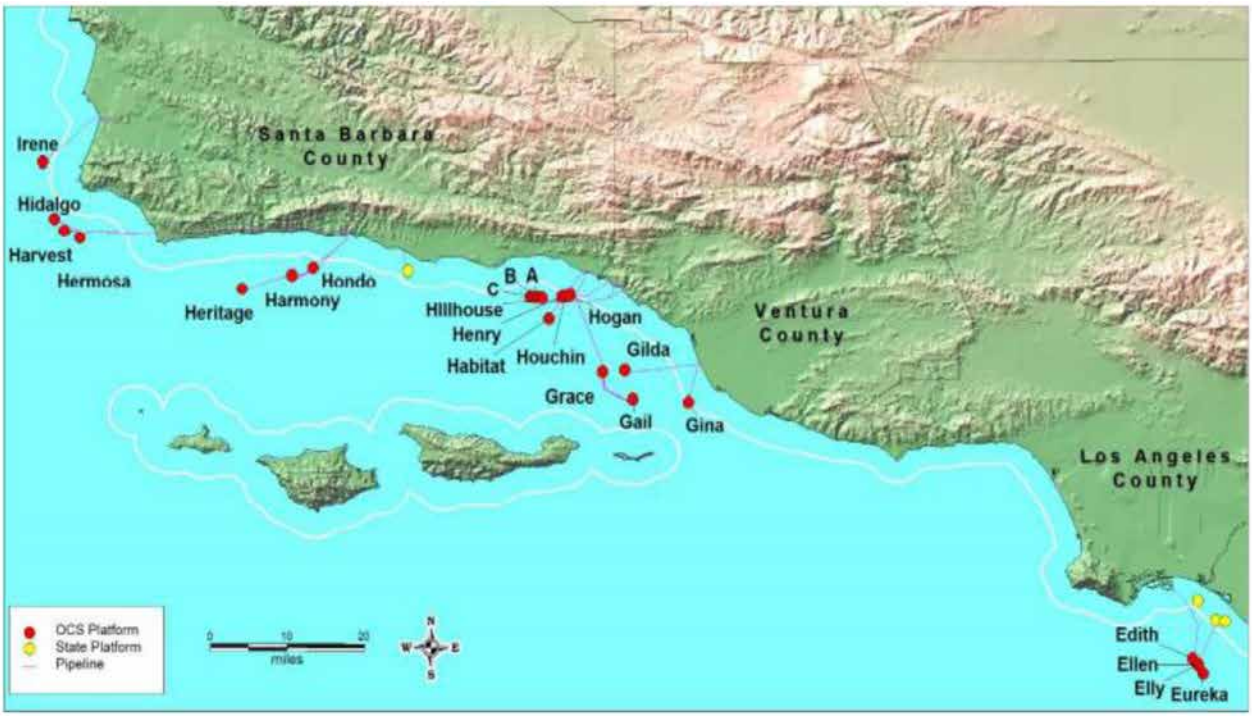

Figure 1—California OCS Oil and Gas Platforms(Source, MRS Environmental, Inc.)

The installation date, age, water depth, operating status, estimated removal weights, and the companies operating the platforms are shown in Table 1. At the close of 2022 eight (Gail, Grace, Harvest, Hermosa, Hidalgo, Habitat, Hogan, Houchin) of the 23 OCS platforms and one state waters platform (Holly) were on terminated leases and in the early stages of being decommissioned by the companies obligated to remove the facilities.

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Table 1—Federal OCS Platforms Located Offshore California

Platform	Year Installed and Age (years)		Operating Status First Qtr. 2023	Water Depth (feet)	Estimated Removal Weight (short tons)	Wells Drilled	OCS Operator[1]
San Pedro Bay - Los Angeles County							
Eureka	1984	38	Shut-in	700	33,377	50	BOC
Elly[2]	1980	42	Shut-in	255	9,400	0	BOC
Ellen	1980	42	Shut-in	265	11,655	63	BOC
Edith	1983	39	Shut-in	161	8,556	18	DCOR
Eastern Santa Barbara Channel - Ventura and Santa Barbara County							
Hogan	1967	55	Leases terminated	154	5,098	39	BWEG[3]
Houchin	1968	54	Leases terminated	163	5,615	35	BWEG[3]
A	1968	54	Producing	188	4,896	52	DCOR
B	1968	54	Producing	190	4,959	57	DCOR
C	1977	45	Producing	192	5,718	38	DCOR
Henry	1979	43	Producing	173	4,006	23	DCOR
Hillhouse	1969	53	Producing	190	5,834	47	DCOR
Gina	1980	42	Producing	95	1,380	12	DCOR
Gilda	1981	41	Producing	205	11,293	63	DCOR
Habitat	1981	41	Leases terminated	290	9,611	20	DCOR
Gail	1987	35	Leases terminated	739	37,057	28	BWEG[4]
Grace	1979	43	Leases terminated	318	13,074	28	BWEG[4]
Western Santa Barbara Channel - Santa Barbara County							
Hondo	1976	46	Shut-in	842	29,478	28	XOM
Harmony	1989	33	Shut-in	1,198	86,513	34	XOM
Heritage	1989	33	Shut-in	1,075	69,192	48	XOM
Santa Maria Basin - Santa Barbara County							
Harvest	1985	37	Leases terminated	675	35,150	19	FMC
Hermosa	1985	37	Leases terminated	603	30,868	13	FMC
Hidalgo	1986	36	Leases terminated	430	23,384	14	FMC
Irene	1985	37	Shut-in	242	8,762	26	FMC

[1]Beta Operating Company, LLC (BOC); Dos Cuadras Offshore Resources, LLC (DCOR); Beacon West Energy Group, LLC (BWEG); ExxonMobil Corp. (XOM): Freeport McMoRan Oil, Gas, LLC (FMC)

[2]Platform Elly is a production handling and processing platform for Platforms Ellen and Eureka.

[3]BWEG is ConocoPhillips Agent for monitoring and maintaining Platforms Hogan and Houchin.

[4]BWEG is Chevron's Designated Agent for decommissioning purposes.

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In addition to the eight OCS platforms on terminated leases, seven platforms (Eureka, Elly, Ellen, and Edith, Harmony, Heritage, Hondo) were shut-in (inactive and not producing) at the close of 2022 due to onshore and offshore pipeline ruptures that transported oil gas produced by the platforms to processing facilities. Platforms Eureka, Elly, Ellen, and Edith were shut-in in October 2021 due to the rupture of the 17-mile-long oil pipeline that transported oil produced at the platforms from Platform Elly to a pumping station at the Port of Long Beach. The U.S. Coast Guard reported the spill was likely caused by a ship anchor that struck and displaced a section of the pipeline (Los Angeles Times, 2021). The pipeline has been repaired and is expected to resume operations in the near-term. Platforms Harmony, Heritage and Hondo have been shut-in since May 2015 following the onshore rupture and closure of the Plains All American Pipeline (PAAP) that transported oil and gas produced by the platforms to processing facilities. The platforms are expected to eventually return to full production when the PAAP pipeline is either replaced or repaired. There is currently no definitive timeline for returning the PAAP pipeline to service. Platform Irene was shut-in in late 2022 hen operations became uneconomic due to high operating costs.

OCS Regulations and NEPA Environmental Review Process

The BSEE regulates OCS oil and gas platform decommissioning activities under the authority granted by the OCS Lands Act and its implementing regulations found in Title 30, Code of Federal Regulations (30 CFR §250.1700-1754). Under the OCS regulations, when a platform is no longer useful for operations, operators are required to:

1. Permanently plug all wells.
2. Remove all platforms and other facilities to a depth of 15 feet below the mudline.
3. Decommission all pipelines.
4. Clear the seafloor of all obstructions on the lease or pipeline right-of-way.

The OCS regulations (30 CFR §250.1728) require platforms and other facilities (including templates and pilings) to be removed to a depth of at least 15 feet below the mud line. The regulations also allow BSEE to approve an alternate removal depth if any one of the following conditions is met:

1. The remaining structure would not become an obstruction to other users of the seafloor or area, and geotechnical and other information operators provide demonstrate that erosional processes capable of exposing the obstructions are not expected.
2. The company responsible for decommissioning determines, and BSEE concurs, the use of divers is required, and seafloor sediment stability poses safety concerns.
3. The water depth is greater than 800 meters (2,624 feet).

The regulations also allow BSEE to grant a departure from the requirement to remove a platform if the structure is converted to an artificial reef. To grant a departure from removing an OCS platform, the following conditions must be met:

1. The structure becomes part of a State artificial reef program.
2. The responsible State agency acquires a permit from the U.S. Army Corps of Engineers and accepts title and liability for the structure.
3. U.S. Coast Guard navigational safety requirements for the structure are satisfied.

Under the OCS oil and gas regulations (30 CFR 250.1704) operators in the Pacific Region are required to submit an initial platform removal application to BSEE at least two years before production is projected to cease, and a final decommissioning application within two years after the initial application is submitted (BSEE, 2020). On July 23, 2021, BSEE issued a Federal Register notice announcing it was preparing a Programmatic Environmental Impact Statement (PEIS) for decommissioning OCS oil and gas platforms

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and facilities offshore Southern California (Federal Register, 2021). The purpose of the PEIS is to evaluate a broad range of environmental effects and mitigation measures associated with decommissioning alternatives such as full and partial removal of platforms and pipelines to support Federal review of and action on future decommissioning applications for platforms, pipelines, and other facilities. The draft PEIS was released for public comment on October 12, 2022 (Federal Register, 2022). The final PEIS is scheduled to be released in the summer of 2023.

To support its decisions on future platform and pipeline decommissioning applications submitted by operators of California OCS platforms, BSEE is expected to prepare project specific Environmental Impact Statements (EIS) to satisfy the requirements of the National Environmental Policy Act (NEPA). The EIS process typically requires one to two years to complete and begins when BSEE determines an operators final decommissioning application to be complete. Operators planning to conduct a decommissioning project are also required to submit a consistency certification along with supporting information and data to the California Coastal Commission (CCC) demonstrating their project will be consistent with the state coastal zone policies. Under the Coastal Zone Management Act (CZMA), BSEE cannot approve an operator's platform decommissioning application until the CCC has either concurred with the operator's certification, waived the need for consistency, or the Secretary of Commerce, on appeal, overrides the CCC objection to certification.

Platform Decommissioning Projects and Outlook

This section describes the ongoing decommissioning operations being conducted at the eight OCS platforms located on terminated leases and the circumstances that led to the platforms being decommissioned. Three of the platforms, Gail (739 ft. wd.), Harvest (675 ft. wd.), and Hermosa (603 ft. wd.), would each establish world water depth records (approximately 500 ft.) for fully removing conventional oil and gas platform jackets from the seafloor (Chevron, 2021).

Platforms Gail, Grace.

Platforms Gail (Fig. 2) and Grace are in the eastern Santa Barbara Channel offshore Ventura County. Platform Gail is in 739 feet of water and has an estimated removal weight of 37,057 tons. Platform Grace is in 318 feet of water and has an estimated removal weight of 13,074 tons. The platforms have been shut-in since May 2015 following the onshore rupture and closure of the PAAP that transported oil and gas produced by the platforms to onshore processing facilities. The pipeline closure resulted in the previous operator of the platforms, Venoco, LLC (Venoco), filing for bankruptcy in 2017 and relinquishing the platform leases in January of 2018 (BSEE, 2021). The platforms are currently operated by Beacon West Energy Group, LLC (BWEG) which has been designated by Chevron, the former owner and operator of the platforms, to serve as its "Decommissioning Agent" for decommissioning purposes. Chevron has been preparing the platforms for decommissioning by permanently plugging and sealing the wells, cleaning and purging vessels and piping, and removing out of service equipment.

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Figure 2—Platform Gail (739 ft. water depth)

Platforms Harvest, Hermosa, Hidalgo.

Platforms Harvest (Fig. 3), Hermosa, and Hidalgo are located offshore Point Arguello in Santa Barbara County. The platforms are in water depths ranging from 430 to 675 feet and have estimated removal weights ranging from 23,384 to 35,150 tons. Like Platforms Gail and Grace, the platforms were shut-in in May 2015 following the onshore rupture and closure of the PAAP. Due to lack of operations and the decision of Freeport McMoRan Oil and Gas, LLC (FMC), the operator of the platforms, to forgo requesting a suspension of operations from BSEE, the platform leases were terminated in November of 2018 in accordance with OCS oil and gas regulations (BSEE, 2021). Under the original lease instrument and previous contractual agreements associated with the assignment of the OCS platform leases to other companies, Chevron retained responsibility for conducting most of the decommissioning obligations, including platform removal and pipeline abandonment. FMC's decommissioning responsibilities include well plugging and abandonment, conductor removal, and site clearance. Well plugging and abandonment and conductor removal operations have been completed at all three platforms.

Figure 3—Platform Harvest (675 ft. water depth)

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Platform Habitat.
Platform Habitat is in the eastern Santa Barbara Channel, offshore Ventura County (Fig.1). The platform is in 290 feet of water and has an estimated removal weight of 9,611 tons. Platform Habitat is operated by Dos Quadras Offshore Resources, LLC (DCOR) and has historically been a natural gas production platform. The platform is currently shut-in and has not produced gas in paying quantities since at least January 2015. Platform Habitat is currently in a state BSEE refers to as "preservation" which essentially means that platform facilities and pipelines are being maintained by the operator in a safe condition until the time decommissioning is complete. DCOR is presently refurbishing the platform and is planning to start plugging and abandoning the 20 platform wells in 2023. Well plugging and abandonment and conductor removal operations are estimated to take one to two years to complete.

Platforms Hogan, Houchin.
Platforms Hogan and Houchin are in the eastern Santa Barbara Channel, offshore Ventura County (Fig. 1). The platforms are in approximately 160 feet of water and have estimated removal weights of 5,098 and 5,615 tons, respectively. Platforms Hogan and Houchin were operated by Pacific Operators Offshore, LLC (POOL) and located on an OCS lease (OCS P-0166) owned by Signal Hill Services Inc. (Signal). The platforms were shut-in 2020 following a decision by the California State Lands Commission (CSLC) on June 28, 2019, to terminate the state tidelands leases and Right of Way (ROW) for the pipelines that transported the oil and gas produced by Hogan and Houchin to onshore processing facilities (CSLC, 2019). The CSLC's termination decision also directed the tidelands lease and ROW owners, Signal and Carone Petroleum Corporation, to abandon and decommission the state water segments of the pipelines. The state tidelands leases and ROW were terminated by CSLC due to the failure of the lease owners to pay their lease rental fees and provide sufficient bonding.

Following CSLC's termination of the state tidelands leases and ROW, Signal officials informed BSEE they did not have the financial capability to decommission Platforms Hogan and Houchin. On October 14, 2020, Signal relinquished the OCS lease (OCS-P 0166) on which the platforms are located. BSEE has called on the previous operator (ConocoPhillips) and other former lessees to decommission the platforms and associated pipelines. ConocoPhillips has designated BWEG as its agent for monitoring and maintaining the platforms in a safe condition until they are decommissioned. ConocoPhillips is currently overseeing refurbishment of the platform cranes and other facilities in preparation for permanently plugging and abandoning the 74 wells on Platforms Hogan and Houchin. The wells are expected to be permanently plugged and abandoned within two years.

Platform Holly.
In state waters, Platform Holly is under the control of the CSLC following the bankruptcy of Venoco, the former operator of the platform. The platform is in 211 feet of water and was reported to have a total installation weight of approximately 7,000 tons. The platform is in the early stages of being decommissioned by ExxonMobil Corporation, the former operator of the platform. The CSLS has reported the cost to fully remove the platform could reach $475 million (Santa Barbara Independent, 2022).

Decommissioning Forecast Through 2030

The forecast for decommissioning OCS platforms through the end of the decade is summarized in Table 2. Eight OCS platforms (Gail, Grace, Harvest, Hermosa, Hidalgo, Habitat, Hogan, Houchin) and one state water platform (Holly) are projected to be decommissioned this decade. There is no option to bring these platforms back into production because the OCS leases on which the platforms are located have either been relinquished or are expired.

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Table 2—California OCS Platforms Projected to be Decommissioned by 2030

Platform	Water Depth (feet)	Estimated Removal Weight (short. tons)	Wells	Operating Status First Qtr. 2023	Current Operator[1]	Major Companies Holding Decommissioning Obligations
Gail	739	37,057	27	Shut-in	BWEG[2]	Chevron
Grace	318	13,074	28	Shut-in	BWEG[2]	Chevron
Harvest	675	35,150	19	Shut-in	FMC	Chevron/FMC
Hermosa	603	30,868	13	Shut-in	FMC	Chevron/FMC
Hidalgo	430	23,384	14	Shut-in	FMC	Chevron/FMC
Habitat	290	9,611	20	Shut-in	DCOR	DCOR
Hogan	154	5,098	39	Shut-in	BWEG[3]	ConocoPhillips
Houchin	163	5,615	35	Shut-in	BWEG[3]	ConocoPhillips
Holly	211	7,000	30	Shut-in	CSLC[4]	ExxonMobil

[1]Beacon West Energy Group, LLC (BWEG); Freeport McMoRan Oil, Gas, LLC (FMC); Dos Cuadras Offshore Resources, LLC (DCOR).

[2]BWEG is Chevron's Designated Agent for decommissioning purposes.

[3]BWEG is ConocoPhillips Agent for monitoring and maintaining Platforms Hogan and Houchin.

[4]Holly is under the control of CSLC.

Due to low production levels, high operating costs, and depletion of reserves, it appears likely several of the producing platforms (A, B, C, Henry, Hillhouse, Gina, Gilda) operated by DCOR in the eastern Santa Barbara Channel (see Table 1) could also be decommissioned by 2030. These platforms range from 41-54 years in age, and many have been producing less than 300 barrels of oil per day. The ability of the producing platforms to sustain or increase production in response to high oil and gas prices was further constrained by a recent ruling by the Ninth Circuit Court of Appeals which ordered a moratorium on fracking and acidizing of oil wells in federal waters offshore the coast of California until a thorough environmental review (Environmental Impact Statement) of the drilling activity is conducted and the drilling activity is reviewed for consistency by the California Coastal Commission in accordance with the provisions of the Coastal Zone Management Act (U.S. Court of Appeals, Ninth Circuit, 2022).

Decommissioning Challenges

The process of decommissioning an offshore oil and gas platform is a challenge under any circumstances in terms of planning and executing the work in a safe, environmentally sound, and costeffective manner. This is particularly the case in California where the operators of oil and gas platforms face a unique combination of technical, safety, logistical, environmental, and regulatory challenges. Among the major challenges are the following:

Large Deep-water Structures.

Approximately one-third of the 23 OCS oil and gas platforms exceed 10,000 tons in weight and are in water depths exceeding 400 feet. Seven of the platforms are in water depths exceeding 500 feet which approximates the world water depth record for fully removing a conventional steel platform jacket from the seafloor. Three of the OCS platforms (Gail, Harvest, Hermosa) currently being decommissioned by Chevron are in water depths exceeding 600 feet. These platforms have massive footings that were not designed to be removed. The full removal of these structures will pose significant engineering and safety challenges.

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Lack of Decommissioning Infrastructure and Services.
There is little or no existing decommissioning infrastructure in southern California such as heavy lift vessels (HLVs), anchor handling vessels, dive support vessels having dynamic positioning capability (DP2s), rigless well plugging and abandonment services, and abrasive and mechanical cutting services. The vessels and services will be required to be mobilized from the Gulf of Mexico (GOM) and other distant locations where offshore oil and gas development and decommissioning activities are concentrated.

HLV Mobilization Costs.
There are currently no HLVs stationed on the west coast that have the lifting capacities to both safely and efficiently remove the topsides modules and jackets of the large deep-water platforms. To fully remove the topsides and jackets of the deep-water structures, HLVs like the Saipem 7000 (Fig. 4), equipped with dual cranes each having a lift capacity of 7.700 short tons, are likely to be mobilized at great expense from distant locations in the GOM, the North Sea, South America, or the Asia-Pacific region where they typically operate. The day rates of the HLVs historically have ranged from $200,000 to $600,000 per day or higher, and the round-trip mobilization times could range from 80 to 110 days depending on the transit speed of the HLV and distance travelled. Using these durations and day rates, total HLV roundtrip mobilization costs to California would range from $16 million to $66 million.

Figure 4—Saipem 7000

Jones Act Restrictions.
The use of foreign-flagged HLVs to remove California oil and gas platforms must comply with the requirements of the Jones Act. The Jones Act generally requires that vessels carrying merchandise between any two points in the United States be owned and crewed by U.S. citizens, registered under the U.S. flag, and built in the United States. Under the Jones Act, OCS oil and gas platforms are considered points in the United States. Foreign-flagged HLVs therefore cannot be used to directly transport and offload the topsides

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and jacket sections of a platform at a U.S. port, as is the common practice in the North Sea. Foreign-flagged HLVs could be used to dismantle the platforms, but the materials would need to be transported to shore using U.S. flagged vessels and cargo barges. Offshore service and supply vessels are also required to comply with the requirements of the Jones Act.

Lack of Onshore Processing and Disposal Options.

There are very limited onshore disposal options for platform topside and jacket materials in southern California. The only port-based facilities that process scrap metal in the region are operated by SA Recycling, LLC at Berths 210-211 on Terminal Island at the Port of Los Angeles, and Berth 118 at the Port of Long Beach. The facilities collect and process heavy metal scrap and recycle ferrous and nonferrous metals recovered from automobiles, appliances, and rail cars (Byrd et al., 2018). The facilities are relatively small-scale operations, encompassing areas of 16 and 26 acres respectively, and neither have the crane capacities and open storage space required to offload and stack the large topside modules and jacket sections of deep-water platforms. The full removal of three deep-water platforms could generate between 90,000 and 150,000 tons of material. Projects of this scale will far exceed the capacities of the existing facilities and necessitate consideration of other disposal options, including expanding and upgrading the existing facilities, building new facilities on the west coast, or transporting the materials to scrap iron processing facilities in Mexico, the GOM, or in the Asia-Pacific region.

Air Quality Compliance Costs.

The full removal of a large deep-water California OCS platform has the potential to generate a significant quantity of air emissions in a region where air quality is tightly regulated. The air emissions from OCS oil and gas related operations and decommissioning activities offshore California are regulated by the local air pollution control districts (APCDs) in Santa Barbara, Ventura, and Los Angeles County (Santa Barbara County APCD, 2020). The APCDs issue permits that typically specify hourly, daily, and annual emissions for criteria pollutants and key precursors such as ozone. The air quality regulations issued by the APCDs also require projects exceeding air quality standards to mitigate project emissions below emission thresholds to assure a net air quality benefit for the project. Given the large quantity of emissions likely to be generated by a deep-water platform decommissioning project, air emission mitigation costs are likely to be very high, particularly if the engines on the vessels used during the project are required to undergo expensive retrofitting before they can operate offshore California.

Site Clearance and Debris Removal.

Operators planning OCS platform decommissioning projects will need to provide detailed information to BSEE, the U.S. Army Corps of Engineers (ACOE), and other regulatory agencies demonstrating shell mounds do not pose an obstruction to other ocean users like commercial trawling vessels, and that the drill muds and cuttings discharged from the platforms do not pose a threat to the marine environment. Surveys have shown that shell mounds ranging from two to 26 feet in height have formed under or near the base of many OCS platforms (MEC, 2003). The mounds are composed of drill muds and cuttings and natural shell and marine growth that has fallen or been periodically removed from the platform legs by divers using high pressure water jets to reduce wave forces on the structure.

Under OCS regulations (30 CFR §250.1728), the legs and pilings of a platform are required to be removed to a depth of 15 feet below the mudline. Removal operations and anchoring activities will cause disturbances to the seabed which could release elevated concentrations of metals associated with drilling wastes (barium, chromium, lead, zinc) as well as monoclinic and polyclinic aromatic hydrocarbons (PAHs). Potential seabed obstructions like shell mounds and operations that result in disturbances of the seabed are regulated by the U.S. Army Corps of Engineers (ACOE) under Section 10 of the Rivers and Harbors Act, Section 404 of the Clean Water Act, and Section 103 of the Marine Protection, Research and Sanctuaries Act. If hazardous

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materials are found to be present in the drill cuttings and shell mounds, the materials could be required to be removed and taken to approved onshore or offshore hazardous waste disposal sites, reinjected in an offshore disposal well, or capped with inert material such as sand, gravel, and rocks to prevent the release of hazardous materials in the marine environment.

Environmental and Space Use Operating Constraints.

Most of the future OCS platform decommissioning activity offshore California will take place in the Santa Barbara Channel where 15 of the 23 OCS platforms are located. The Santa Barbara Channel is part of an important marine ecosystem that provides critical habitats for multiple species (whales, dolphins, porpoises, seals, sealions, humpback whales, blue whales, sea turtles, sea otters, marine and coastal birds, and fishes). The Channel is also bordered by Channel Islands National Marine Sanctuary which covers an area of 1,000 square miles and extends seaward about six nautical miles offshore San Miguel Island, Santa Rosa Island, Santa Cruz Island, Anacapa Island, and Santa Barbara Island. The Channel is also used heavily by commercial and recreational fishermen and hosts a shipping lane that thousands of cargo ships use annually on the approach to and departure from the Ports of Los Angeles and Long Beach. The U.S. Navy and the U.S. Air Force also conduct extensive military operations in the Channel and surrounding areas from bases located at Point Mugu, Port Hueneme and Vandenberg. To protect sensitive marine resources and address space use concerns, regulatory agencies have placed operating constraints on previous decommissioning and marine construction projects. The constraints have included requirements to temporarily cease operations when whales and other marine mammals are observed near the construction zone, reduce vessel speeds, use low sulfur fuels, and stay within approved vessel transportation corridors. In addition, operators will need to work closely with commercial and recreational fishermen to address concerns about fishing preclusion zones established to avoid interference with decommissioning operations, and compensation for lost catch.

Complex Regulatory Framework and Risk of Litigation.

There are more than 20 federal, state, and local regulatory agencies (Table 3) that issue permits or approvals over various aspects of OCS platform decommissioning projects, including pipelines and power cables that are routed to shore, and associated onshore processing and support facilities. The NEPA environmental review process is also lengthy, typically ranging from one to two years for the preparation of a project-specific Environmental Impact Statement to support permitting decisions by BSEE and other federal regulatory agencies. Agency permitting approvals can also be appealed and litigated by environmental groups and other parties further complicating and delaying the planned commencement of the decommissioning project.

Table 3—Federal, State and Local Agencies that Permit and Review Decommissioning Activities

Agency	Regulated Activity
Federal Agencies	
Bureau of Safety & Environmental Enforcement	• Approves OCS platform decommissioning applications and enforces OCS oil and gas safety and environmental regulations.
U.S. Army Corps of Engineers	• Issues Section 404 permits for discharges of dredged or fill material in U.S. waters. • Issues Section 10 permits for the construction of any structure in or over the navigable waters of the U.S.
U.S. Fish and Wildlife Service	• Issues Biological Opinions/Incidental Take Permits for endangered species and permits for projects that affect migratory birds.
National Marine Fisheries Service	• Issues Biological Opinions and Incidental Take Permits to ensure protection of threatened and endangered species, marine mammals, and essential fish habitat.

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Agency	Regulated Activity
Environmental Protection Agency	• Issues National Pollution Discharge Elimination System (NPDES) permits for discharges of pollutants from point sources on the federal OCS. • Sets standards for protection of air quality.
U.S. Coast Guard	• Regulates navigation safety and issues permits that prescribe requirements for the types of aids to navigation (e.g., lights, fog horns) to be maintained on structures.
U.S. Dept. of Transportation (DOT) Pipeline & Hazardous Material Safety Admin.	• Regulates decommissioning of pipelines under DOT authority.
State Agencies	
California State Lands Commission	• Regulates decommissioning activities in state waters.
State Fire Marshal Office	• Regulates and inspects interstate and intrastate hazardous liquid pipelines emanating from offshore oil and gas platforms that cross state boundaries.
California Coastal Commission	• Issues permits for activities conducted in state waters and the coastal zone and conducts consistency reviews of projects on the federal OCS.
Department of Fish and Wildlife	• Responsible for protecting threatened and endangered species and other marine and onshore resources including streams and wetlands
Regional Water Quality Control Boards	• Regulates discharges that may affect water quality in state waters and onshore.
State Office of Historic Preservation	• Responsible for protecting historic and prehistoric resources.
California Natural Resources Agency	• Responsible for protecting and managing the State's natural, historical, and cultural resources.
Ocean Protection Council	• Tasked with coordinating ocean-related activities, scientific research, ocean restoration, and pollution prevention.
Local Agencies (Santa Barbara, Ventura and Los Angeles County)	
County Planning Departments and Resource Management Agencies	• Regulates onshore facilities and offshore submerged lands in state waters that have been granted to the County by the State of California.
County Air Pollution Control Districts	• Regulates emissions from projects on the federal OCS, state waters and onshore.

An Unworkable Reefing Law and Lack of a State Approved Artificial Reef Program.
In contrast to the GOM, where more than 550 decommissioned platforms have been converted to artificial reefs, the State of California does not have reefing legislation considered workable by industry, nor does it have an approved or funded artificial reefing program which is a prerequisite under OCS oil and gas regulations for approving conversion of a platform jacket to an artificial reef (Aquarium of Pacific, 2020). To date, only seven shallow water platforms have been decommissioned in State waters, the most recent being platforms Hope, Heidi, Hilda, and Hazel in 1996 (Mount and Voskanian, 2005). At the time the platforms were decommissioned, there was no option to reef the platforms due to lack of lack of legislation authorizing the conversion of the platforms to artificial reefs. In 2010, the State legislature enacted the *California Marine Resources Legacy Act* (AB 2503) which allowed, on a case-by-case basis, the partial removal of a federal OCS platform jacket and the conversion of the jacket *in-situ* to an artificial reef managed by the California Department of Fish and Wildlife (CDFW).

To receive CDFW approval to reef an OCS platform, certain conditions must be met. These include, among others, that the creation of the reef results in a "*net environmental benefit to the marine environment*", and that 80 percent of the cost savings to the platform owner from partial, as opposed to full removal, be transferred to the State and be deposited in the California Endowment for Marine Preservation. In addition,

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AB 2503 requires the first reefing applicant to cover CDFW costs to set-up the platform jacket artificial reefing program, and to sign an agreement indemnifying and protecting the State from liability. There is a consensus among those in the oil and gas industry that AB 2503 is unworkable in its present form due to its liability provisions, high cost-sharing requirements, and high and indeterminate set-up costs for establishing a CDFW managed artificial reefing program. Absent amendments to AB 2503 and the establishment of approved and funded state artificial reefing program, it is unlikely any of the OCS platform jackets will be converted to artificial reefs.

Summary and Conclusion

The authors of this paper project that one-third of the 23 OCS platforms located offshore California are likely to be decommissioned by the end of the decade, and at least 50 percent of the platforms are likely to be removed by the middle of the next decade. Eight of the platforms (Gail, Grace, Harvest, Hermosa, Hidalgo, Habitat, Hogan, Houchin), along with Platform Holly in state waters, are currently in the early stages of being decommissioned. Three of the deep-water platforms, Gail (739 ft. wd.), Harvest (675 ft. wd.) and Hermosa (603 ft. wd.), if fully removed, would each establish world water depth records (approximately 500 ft. wd.) for fully removing conventional fixed steel jacketed platforms from the seabed. The companies responsible for decommissioning the California OCS platforms face daunting technical, logistical, environmental, and regulatory challenges in planning and conducting decommissioning projects. The challenges include:

1. Large, deep-water structures.
2. Lack of decommissioning infrastructure and services locally.
3. High HLV mobilization costs.
4. Jones Act restrictions.
5. Limited onshore processing and disposal options.
6. Air quality compliance costs.
7. Site clearance and debris removal requirements.
8. Environmental and space use operating constraints.
9. A complex regulatory framework and risk of litigation.
10. An unworkable reefing law and lack of a State approved artificial reefing program.

It will be very interesting to see how the industry manages these challenges going forward.

References

Aquarium of the Pacific, 2020. Offshore Oil Platform Decommissioning Forum, January 12-14, 2020. February 2020. 36 p. https://www.aquariumofpacific.org/downloads/Offshore_Forum_2020_V5_LoRes_wLinks.pdf

Bureau of Safety and Environmental Enforcement. 2021. Pacific Region Federal OCS Decommissioning. https://www.bsee.gov/stats-facts/ocs-regions/pacific/pacific-region-federal-ocs-decommissioning

Bureau of Safety and Environmental Enforcement. 2020 NTL No. 2020-P02. Notice to Lessees and Operators of Federal Outer Continental Shelf Oil and Gas Leases in the Pacific Outer Continental Shelf Region. Decommissioning of Pacific Outer Continental Shelf Region (POCSR) Facilities. Effective Date: August 21, 2020. http://www.bsee.gov/notices-to-lessees-ntl/ntl-2020-p02-decommissioning-of-pacific-outer-continental-shelf-region-pocsr

Byrd, R., Smith, J., Spease, S. 2018. The Challenges Facing the Industry in Offshore Facility Decommissioning on the California Coast, OTC-28844-MS, Offshore Technology Conference, Houston, TX., April 30 - May 3, 2018. 25 p.

California State Lands Commission. 2019. The State Lands Commission Terminated Three Offshore Oil and Gas Leases and a Pipeline Right of Way Lease. June 28, 2019, Oil and Gas Press Release 1 p. https://www.slc.ca.gov/oil-and-gas/the-state-lands-commission-terminated-three-offshore-oil-and-gas-leases-and-right-of-way-lease-today/

Chevron. 2021. West Coast Decommissioning Program. https://www.chevron.com/stories/west-coast-decommissioning-program

Code of Federal Regulations, 2022. Title 30, Mineral Resources, Outer Continental Shelf (OCS) Oil and Gas Regulations, Parts 250 and 585.

Downloaded from http://onepetro.org/SPEWRM/proceedings-pdf/23WRM/3-23WRM/D031S010R003/3109518/spe-213003-ms.pdf by Robert Byrd on 01 June 2023

Federal Register. 2021. Programmatic Environmental Impact Statement for Oil and Gas Decommissioning Activities on the Pacific Outer Continental Shelf. *Bureau of Safety and Environmental Enforcement. Federal Register*, Vol. **86**, No. 139, Friday, July 23, 2021.

Los Angeles Times. 2021. Amplify Energy and Subsidiaries Charged with Negligence in Orange County Oil Spill. December 15, 2021.

MEC Analytical Systems Inc. and Sea Surveyor Inc. 2003. Final Report - An Assessment and Physical Characterization of Shell Mounds Associated with Outer Continental Shelf Platforms Located in the Santa Barbara Channel and Santa Maria Basin, California. Minerals Management Service OCS Study, Contract No. 1435-01-02-CT-85136. 48 p. https://www.boem.gov/2003-Assessment-Shell-Mounds/

Mount, P. and Voskanian, M. 2005. Offshore California Facility Decommissioning: Past, Present, Future. Paper presented at the SPE/EPA/DOE Exploration and Production Environmental Conference, Galveston, Texas. 7-9 March 2005. SPE 94390. 10 p.

Reuters. 2022. Exxon Challenges Denial of Oil Trucking Permit. May 13, 2022. https://www.reuters.com/world/us/exxon-challenges-california-countys-denial-oil-trucking-permit-2022-05-13/

Santa Barbara Air Pollution Control District. 2019. Air Quality Guidance – Offshore Oil and Gas Platform Decommissioning, May 29, 2019, Jointly Issued with Ventura County Air Quality Management District and South Coast Air Quality Management District, 4 p.

Santa Barbara Independent. 2022. Say So Long to Santa Barbara's Offshore Platforms. January 19, 2022. https://www.independent.com/2022/01/19/so-long-offshore-platforms/

TSB Offshore, Inc. 2016. Decommissioning Cost Update for Pacific OCS Region Facilities, Report prepared for the Bureau of Environmental Safety and Enforcement, Volume **1**, Report No. 735, 143 p. https://www.bsee.gov/sites/bsee.gov/files/tap-technical-assessment-program//decommissioning-cost-update-for-pacific-ocs-region-facilities-volume-1-rev5.pdf

U.S. Court of Appeals for the Ninth Circuit. 2022. Environmental Defense center v. Bureau of Ocean Energy Management. Filed June 3, 2022. 19-55526.pdf (uscourts.gov)

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