

MEMORANDUM

To: Eric Gillies, Project Manager, California State Lands Commission

From: Hayley Carter, Project Scientist, California Ocean Science Trust

CC: Cy Oggins, Chief, Environmental Planning and Management, California State Lands Commission
Jennifer DeLeon, Science Policy Advisor, California State Lands Commission
Michael DeLapa, Interim Executive Director, California Ocean Science Trust
Ryan Meyer, Senior Scientist, California Ocean Science Trust

Date: January 21, 2016

Re: California Ocean Science Trust scientific review of the Ramboll Environ report to the California State Lands Commission *Relationship Between Oil and Gas Production and Natural Seep Intensity in the South Ellwood Field – Santa Barbara*

REVIEW REQUEST AND SCOPE

The California State Lands Commission (CSLC) staff asked the California Ocean Science Trust to coordinate an independent scientific review of *Relationship Between Oil and Gas Production and Natural Seep Intensity in the South Ellwood Field – Santa Barbara* (“Technical Report”), which summarizes existing literature and scientific information linking sub-seafloor oil production with natural oil seep activity. The Technical Report will be part of an Environmental Impact Report (EIR) to inform CSLC decision-making about whether to amend a state oil and gas lease that would allow the requesting company Venoco to implement the South Ellwood Field Project.

Reviewers conducted an assessment of whether:

- the scientific information presented within the report is sound and reasonable;
- the relevant science included in the report is comprehensive and representative of existing knowledge in this field of research; and,
- the conclusions and interpretation drawn in the report are scientifically justified given the available information.

REVIEW PROCESS OVERVIEW

Ocean Science Trust, an independent non-profit organization dedicated to advancing science in decision-making, led the review process between September 2015 and January 2016. Steps included:

1. **Scoping the review.** Ocean Science Trust worked with CSLC staff at the outset to develop and formalize the review scope and process, which articulated shared expectations. These documents are publicly available on the Ocean Science Trust [website](#)¹.
2. **Reviewer selection.** Ocean Science Trust led a process to select three external scientific experts, accepting recommendations from the Ocean Protection Council Science Advisory Team (OPC-

¹ Project page url: <http://www.oceansciencetrust.org/project/oil-seeps-scientific-review/>

SAT), CSLC staff, and Ocean Science Trust’s own professional network. We selected reviewers with relevant expertise and no conflict of interest. Their names were kept anonymous to CSLC staff and the public throughout (i.e., a single blind review). Reviewers were informed of the client and authorship of the report.

3. **Conducting the review.** Ocean Science Trust worked in collaboration with CSLC staff to develop instructions to focus reviewers on the scientific aspects of the Technical Report. Reviewers were asked to respond in writing to questions in the instructions.
4. **Providing deliverables.** Ocean Science Trust produced a public summary of the review (this memo) for inclusion in the EIR documentation. CSLC staff were also provided with additional technical details for consideration, including in-text comments on the Technical Report and individual responses to questions (for internal use only).

Ocean Science Trust values the opportunity to provide scientific support to the State of California. We commend the CSLC’s commitment to ensuring decisions are grounded in sound scientific reasoning and conclusions, and appreciate their constructive engagement throughout the process. Ocean Science Trust appreciates the time and thoughtful reviews provided by selected experts, and acknowledges the funding provided by the California State Lands Commission.

REVIEW SUMMARY

The report *Relationship Between Oil and Gas Production and Natural Seep Intensity in the South Ellwood Field – Santa Barbara* concludes that expanded petroleum production should lower reservoir pressures and locally decrease seep volumes (thus reduce atmospheric emissions). Reviewer consensus is that the large-scale conclusions and interpretations appear warranted. They are generally satisfied with the scientific rigor of the report, but note areas that could be expanded upon, further supported or clarified. The report would benefit from a technical editor and inclusion of an Executive Summary because it is currently written for subject matter experts. Reviewers agree that addressing in-text comments on the draft would help decision-makers.

See below for a summary of the review.

Scientific Rigor

Given the scope of the report (to summarize available information), reviewers were largely satisfied with the scientific rigor of the analysis. They noted:

- The term “seepage” should be explained. Reviewers found it unclear whether the term refers to gas or oil seepage, or if the focus of the report is only on gas and atmospheric greenhouse gas contributions.
- The presentation of the geologic framework and petroleum geology of this area could be improved. Text could be added that efficiently summarizes the regional and local geology, the petroleum source, the migration pathways, the reservoir, the trap, and the mode of production. New information is available about significant local marine geologic hazards.

- An updated hazard assessment could/should be conducted as a precursor to further future offshore development. Specific questions that could be posed include: (1) Is Platform Holly engineered for the strong ground motions generated by large earthquakes in the area? (2) Could changes in petroleum reservoir pressures have any impact on the stability of the nearby shelf break upper slope?
- Steps could have been taken to quantify additional factors that authors identified as lacking data, potentially through modeling, though they recognize this is outside the scope of the study.

Comprehensiveness of Cited Literature

Overall, reviewers are comfortable that the report cites relevant data. Reviewers note further studies that could provide additional support. However, some of the most important, extensively cited references were not accurately included in reference list, detracting from the credibility of the report. Additionally, reviewers suggest including new comprehensive USGS maps and digital datasets for the Coal Oil Point area, which include 1:24,000 scale maps of seepage locations, geologic maps showing pockmark fields, seismic-reflection profiles, and other relevant information.

Science-Based Conclusions

The reviewers concur that the large-scale conclusions and interpretations in the report appear warranted. Expanded petroleum production should lower reservoir pressures and locally decrease seep volumes. Reviewers note several areas where additional support would make the analysis and correlations more robust, including:

- discussion of the caveat to the conclusion regarding proposed drilling and production methods; and,
- additional understanding of the seeps in this area and their connection to subsurface geology, including image analysis. This would provide important understanding of seep sources and gas migration pathways, since decreasing seep volumes is presented as a major rationale for granting the lease-line adjustment.

Structure and Presentation

Reviewers mention the report would benefit from the assistance of a technical editor and inclusion of a two to three page Executive Summary for decision-makers. The report is written for subject matter experts, and the writing style could be clearer and include more discussion in some areas. In addition, many figures were low-resolution with illegible labels. Cross section lines were not always shown, and two figures (3 and 6) showed different targets for the proposed new wells, which could lead to miscalculation of seepage rates.

Responses to reviewer comments would improve the Technical Report to aid decision-making.