

<b>DOCKETED</b>	
<b>Docket Number:</b>	21-ESR-01
<b>Project Title:</b>	Energy System Reliability
<b>TN #:</b>	244346
<b>Document Title:</b>	Michael Stocker - Ocean Conservation Research Comments - Triple faultlines - we've been keeping our fingers crossed for a decade
<b>Description:</b>	N/A
<b>Filer:</b>	System
<b>Organization:</b>	Michael Stocker - Ocean Conservation Research
<b>Submitter Role:</b>	Public
<b>Submission Date:</b>	8/7/2022 12:44:20 PM
<b>Docketed Date:</b>	8/8/2022

*Comment Received From: Michael Stocker - Ocean Conservation Research  
Submitted On: 8/7/2022  
Docket Number: 21-ESR-01*

## **Triple faultlines - we've been keeping our fingers crossed for a decade**

The last time we visited the Diablo Canyon Nuclear Power Plant issue was just after the Fukushima disaster - and the concern that Californians had that a similar disaster could occur here. Unfortunately the survey plan was incredibly contentious - sullied with expansive seismic surveys that arguably would have provided fossil fuel companies a look into potential hydrocarbon resources off our coast. Given the ham-handedness of PG&E, mistrust ran high, and in the end, the decision was to not do any surveys, run out the clock on the Diablo Canyon permit (2025), and pray that we don't have a seismic event before then.

Should the permit be extended, the surveys will need to be done - because we can't afford to continue praying that a seismic event will not occur. In our critique of the 2012 survey proposal, we suggested a work-around using "Full Tensor Gravity Gradiometry" survey to find the local aberrations that warrant more detailed examination.

This would satisfy the need for the survey without exacting the broad environmental damage of a full coast seismic survey. The plan would also not expose any potential hydrocarbons that, if exposed, would surely provide a "camel's nose under the tent" situation with the fossil fuel industry.

*Additional submitted attachment is included below.*

# OCEAN CONSERVATION RESEARCH



*Science and technology serving the sea*

October 10, 2012

Michael Payne, Chief  
Permits and Conservation Division  
Office of Protected Resources  
National Marine Fisheries Service  
1315 East-West Highway  
Silver Spring, MD 20910-3225

Re: PG&E/Lamont Doherty California Central Coast seismic imaging project.

Dear Mr. Payne,

We are concerned that the proposed seismic survey of the geological profile of the areas offshore from the Diablo Canyon nuclear power plant are poorly planned and thus will be unnecessarily disruptive to marine life. While we do not believe that the seismic surveys will immediately destroy all marine life in the region as some opponents fear, it is well known that even shipping noise (without seismic airgun signals) increases stress levels in whales<sup>1</sup>. We also know that airgun pulse exposure levels significantly lower than the 160dB “safety zone” will disrupt migration patterns – with the potential to compromise reproductive success of whales<sup>2</sup>. Additionally there is ample evidence that seismic surveys disrupt foraging in sperm whales,<sup>3</sup> and interrupt the vocalizations<sup>4</sup> and “spook”<sup>5</sup> Bowhead whales.<sup>6</sup>

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<sup>1</sup> Rosalind M. Rolland, Susan E. Parks, Kathleen E. Hunt, Manuel Castellote, Peter J. Corkeron, Douglas P. Nowacek, Samuel K. Wasser and Scott D. Kraus (2012) “Evidence that ship noise increases stress in right whales” Proc. R. Soc. B doi:10.1098/rspb.2011.2429

<sup>2</sup> Castellote, M. Clark, C.W., Lammers M.O. “Potential negative effects in the reproduction and survival on fin whales (*Balaenoptera physalus*) by shipping and airgun noise.” International Whaling Commission report SC/62/E3 - 2010

<sup>3</sup> Jochens, A., D. et.al . 2008. Sperm whale seismic study in the Gulf of Mexico: Synthesis report. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2008-006. 341 pp.

<sup>4</sup> Blackwell, S. B., Nations, C.S.S., McDonald, T.L., Greene, C.L., Thode, A., Macrander, M.A. “Effects of sounds from seismic exploration on the calling behavior of bowhead whales. (A) 2008 J. Acoust. Soc. Am. V124: 4

<sup>5</sup> Richardson, J.W., Wursig, B., Greene, C.W. “Reactions of bowhead whales, *Balaena mysticetust* to seismic exploration in the Canadian Beaufort Sea” J.Acoust. Soc. Am 79 (4), 1986

<sup>6</sup> While sperm whales are not common in the area, and Bowheads are an Arctic species, it stands to reason that these species could serve proxy for other mysticetes and odontocetes.

We also know that seismic surveys have agonistic effects on fish species<sup>7</sup>, can cause intermediate to long-term damage to fish hearing mechanisms<sup>8</sup>, damage fish eggs, larvae and fry<sup>9</sup>, and can also damage<sup>10</sup> and kill marine invertebrates<sup>11</sup>.

All of these citations point to the fact that while seismic surveys may not always induce these agonistic, damaging, or deadly interactions, they should be avoided. This is particularly in light of the scheduling of the surveys that overlap the fall migration of Eastern Pacific gray whales.

It is an unfortunate happenstance that Table 4-1 “Estimated Densities of Marine Mammal Species Within the 160 dB Seismic Survey Safety Zone by Survey Area” in the Draft Environmental Assessment<sup>12</sup> does not have NOAA density estimations for this species, and the “Padre Density” Transit and Transects were taken in December through February when most of the whales have reached their southern destination in the lagoons of Baja California. Had these surveys taken place in November and December – to coincide with the proposed seismic survey operations, the densities would likely have been much higher. That many of the gray whales migrating past the subject area in the late fall are also pregnant females highlights the level of poor planning in this aspect of the larger program.

The objective of the entire program is to determine if the level of seismic instability in and around the Diablo Canyon Nuclear Power Plant puts the plant at risk of catastrophic failure in the event of an earthquake. We believe that the proposed marine seismic airgun surveys need to be weighed in terms of a balance of harms. Should there be a large scale seismic event the potential for loss of life and habitat is extremely high, but we believe that if better planned and staged, the geological evidence substantiating the risks could be determined without needing to survey such large areas – or even any of the marine geological profile off of Diablo Canyon.

Bearing in mind that I am not a geophysicist, and strategizing the sequence of the entire program is not under the purview of the National Marine Fisheries Service I only offer the following argument to substantiate our opinion that any “Incidental Harassment” or “Incidental Take” permits should be denied until it is determined that the information assuring safe operation on the power plant could only be secured by way of towed airgun seismic surveys.

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<sup>7</sup> Engås, A. S. Løkkeborg, E. Ona, and A.V. Soldal. (1996). “Effects of seismic shooting on local abundance and catch rates of cod (*Gadus morhua*) and haddock (*Melanogrammus aeglefinus*)”. Can. J. Fish. Aquat. Sci. 53:2238-2249.

<sup>8</sup> McCauley, R. D., Fewtrell, J. & Popper, A. N. (2003). High intensity anthropogenic sound damages fish ears. Journal of the Acoustical Society of America 113, 638–642

<sup>9</sup> J. Dalen and G.M. Knutsen, “Scaring Effects on Fish and Harmful Effects on Eggs, Larvae, and Fry by Offshore Seismic Explorations” in H.M. Merklinger, Progress in Underwater Acoustics 93-102 (1987);

<sup>10</sup> Michel André et.al. 2011. “Low-frequency sounds induce acoustic trauma in cephalopods. Frontiers in Ecology and the Environment” 9: 489–493. <http://dx.doi.org/10.1890/100124>

<sup>11</sup> A. Guerra, A.F. González and F. Rocha (2004) “A review of the records of giant squid in the north-eastern Atlantic and severe injuries in *Architeuthis dux* stranded after acoustic explorations” International Council for the Exploration of the Sea CC:29

<sup>12</sup> Padre Associates “Draft environmental assessment of marine geophysical surveys by the R/V Marcus G. Langseth for the central coastal California seismic imaging project” June 2012 p. 117-119.

I understand that there is substantial data on the Shoreline, Hosgri, Los Osos, and San Luis Bay faults that may already preclude continued operation of the power plant. I understand that the first three of these are not seafloor faults, could be surveyed from terrestrial vibroseis, and modeled in greater detail to assure that the risk-threshold for safe plant operation is not already exceeded by what we can know without obtaining offshore data.

If further data is needed it is possible that a general profile of the entire area could be derived from “Full Tensor Gravity Gradiometry” (FTG)<sup>13</sup> surveys. These might be conducted from airborne<sup>14</sup> or marine towed<sup>15</sup> instruments. If these surveys did not yield the level of detail required for a clear decision, they would likely help focus in on where seismic excitation would yield the most productive data.

And if seismic excitation is still indicated, this setting would be an opportune site for the use of marine vibroseis or other less impulsive energy source.<sup>16</sup> These alternate technologies are non-impulsive and distribute the excitation signal over a longer time domain, and while they may be behaviorally disruptive, they typically would not exceed the current acoustical exposure mitigation thresholds found in the Marine Mammal Protection Act (MMPA).

Furthermore, the sequence of these events could be crafted to assure that any required airgun surveys would not take place when south-bound pregnant gray whales or the north-bound pairs with neonates will not be exposed to unnecessary acoustic trauma.

Of course none of these alternatives will be employed if NMFS issues permits to proceed with the current plan. For this reason we ask that you deny the Incidental Harassment and Incidental Take permits requested by PG&E for the marine seismic surveys off of California’s Central Coast.

Sincerely,



Michael Stocker

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<sup>13</sup> <http://www.arkex.com/bluecube.html>

<sup>14</sup> [http://www.bellgeo.com/Air\\_FTG/Air\\_FTG.html](http://www.bellgeo.com/Air_FTG/Air_FTG.html)

<sup>15</sup> [http://www.bellgeo.com/Marine\\_FTG/Marine\\_FTG\\_introduction.html](http://www.bellgeo.com/Marine_FTG/Marine_FTG_introduction.html)

<sup>16</sup> Weilgart, L.S. (ed) 2010. Report of the Workshop on Alternative Technologies to Seismic Airgun Surveys for Oil and Gas Exploration and their Potential for Reducing Impacts on Marine Mammals. Monterey, California, USA, 31st August – 1st September, 2009. Okeanos - Foundation for the Sea, Auf der Marienhöhe 15, D-64297 Darmstadt. 29+iii pp. Available from [http://www.sound-in-the-sea.org/download/AirgunAlt2010\\_en.pdf](http://www.sound-in-the-sea.org/download/AirgunAlt2010_en.pdf)