

APPENDIX: COMMENT RESPONSE**A.1 PUBLIC PARTICIPATION ON THE DRAFT PROGRAMMATIC ENVIRONMENTAL ASSESSMENT****A.1.1 Draft Programmatic Environmental Assessment (PEA) Availability and Comment Submittal**

On February 22, 2016, the Bureau of Safety and Environmental Enforcement (BSEE) and the Bureau of Ocean Energy Management (BOEM) (collectively, the Bureaus) published a Notice of Availability (NOA) in the *Federal Register* (FR) regarding the public release and availability of the draft Programmatic Environmental Assessment (PEA). The NOA provided information on how to view and obtain a copy of the PEA, information on how to submit comments, and a link to a publicly available website¹ from which to access the draft PEA. Hard copies of the draft PEA were also available at the Santa Barbara Public Library, Santa Barbara, California; E.P. Foster Library, Ventura, California; and the Long Beach Public Library, Long Beach, California. Requests for hard copies of the draft PEA were also accepted by BSEE Headquarters and the BOEM Pacific Region office as specified in the NOA.

The NOA provided a 30-day public comment period, from February 22 to March 23, 2016, during which time comments could be submitted to the Bureaus on the draft PEA. The NOA specified three avenues for delivering comments on the draft PEA:

- Electronically, using a web-based form accessible on the public website, pocswellstim@anl.gov;
- Electronically via email to pocswellstim@anl.gov; and
- Regular mail (or hand carried) to the BSEE Headquarters or BOEM Pacific Region office.

Comments were received from Federal, State, and local officials; Federal, State, and local agencies; environmental and nongovernmental organizations; the oil and gas energy sector; and individuals. Consistent with Council on Environmental Quality (CEQ) National Environmental Policy Act of 1969 (NEPA) regulations, 40 CFR 1503.4, the Bureaus prepared responses to all substantive comments (see Section A.4 of this appendix) and revised portions of the draft PEA to incorporate some of the changes suggested by commenters.

¹ See <http://pocswellstim.evs.anl.gov>.

A.2 COMMENTS RECEIVED

Throughout the 30-day comment period for the draft PEA, a total of 11,319 comment submittals from Federal, State, and local governments and agencies; nongovernmental organizations; and individuals were received by the Bureaus. Each comment submittal may contain one or more individual comments on one or more different topics.

Comments were received from 22 governments and agencies, 102 nongovernmental organizations, and 66 individuals not affiliated with any organization or group. In addition, 11,246 (more than 99% of all comments received) of the comment submittals were received as one of two campaigns.² Commenters associated with either of these campaigns submitted virtually identical letters based on a standardized comment prepared by an organization and raising a specific issue or concern. One of the campaigns resulted in the Bureaus receiving 5,964 letters against “fracking off California’s coast”; these letters were nearly identical to one another and were based on a standardized form letter made available during the comment period by the Center for Biological Diversity. The other campaign resulted in the receipt of 5,282 largely standardized comment submittals in support of “hydraulic fracking offshore.” It was not possible to attribute the source of this latter standardized campaign letter to any organization or individual.

A.3 COMMENT REVIEW AND CATEGORIZATION

Each comment submittal was cataloged, reviewed, and characterized with regard to the individual issues raised within the comment. All comment submittals received during the public comment period were processed and categorized in this manner and considered in the preparation of the Final PEA. In the case of the two campaigns, the campaign submittals were reviewed to identify any additional issues or concerns that the commenter may have added to the standard campaign letter. An individual submittal may identify a number of different issues within its narrative. For example, a single letter may raise issues regarding environmental impacts, the alternatives considered, and/or climate change.

The number of issues raised in any single distinct submittal ranged from one to 10 or more. As comment submittals were reviewed and categorized, comments with similar themes were grouped into categories based on the overall nature of the comment. Analysis of the comments identified 18 major topics of concern covering a wide range of issues, including, but not limited to, compliance and adequacy pertaining to NEPA, the development of alternatives, resource impacts, and cumulative impacts. The major topics raised by commenters are listed in Table A-1.

² A campaign is an organized effort for allowing individuals and other stakeholders an easy way of submitting a comment for or against a proposal. In a campaign, a standard comment is prepared and made available to all interested parties, which need only to add their names and then submit the comment. Typically, the comment submittals received in association with a campaign are identical (or virtually so) and differ only in the submitter.

TABLE A-1 Major Topics Raised by Commenters on the Draft PEA

1. The NEPA Process	10. Risks of Aging Infrastructure
2. NEPA Analysis	11. General WST Use
3. Alternatives Considered	12. End Oil and Gas (O&G) Production
4. Environmental Concerns	13. Monitoring and Environmental Enforcement
5. Seismicity and Landslides	14. Mitigation
6. Accidents	15. Consultation and Review
7. Well Stimulation Treatments (WSTs) and Produced Water	16. Editorial Comments
8. Climate Change	17. Need for Adaptive Management
9. Reform Regulations	18. Incomplete or Unavailable Information

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Because some of the major topics covered a range of issues, the major topics were further characterized into two or more separate subcategories of issues to aid in preparing responses and revising the PEA, as appropriate. Section A.6 of this appendix presents a comment index that lists each commenter and the issue categories associated with their submittal.

A.4 SUMMARY OF THE CHANGES MADE TO THE DRAFT PEA

Following closure of the public comment period on the draft PEA, the Bureaus reviewed and considered all the comments received pertaining to the draft, and made revisions to the PEA as appropriate. Factual or editorial errors identified in the comments were corrected, and text was clarified to address areas of confusion identified by some commenters. Text was also clarified or expanded to provide additional information in a number of areas, including the purpose and need, the proposed action and alternatives, and the discharge of WST-related chemicals.

A.5 RESPONSE TO COMMENTS

Presented below are the major issues that capture the substantive comments raised in the comments received on the Draft PEA.

Issue 1: NEPA Process

A number of commenters requested the NEPA processes followed by the Bureaus include additional public participation in the form of public hearings and a longer comment period beyond the 30-day period identified in the NOA.

Issue 1.1: Public Participation

Commenters on this issue requested a public hearing on the Draft Programmatic Environmental Assessment on the Use of Well Stimulation Treatments (WSTs) on the Southern

1 California Outer Continental Shelf (Draft PEA). Reasons for requesting the hearing include that
2 there is substantial public controversy concerning the proposed action and substantial interest in
3 holding a hearing. One commenter believed that BSEE/BOEM would have benefited from public
4 and agency input during document preparation.
5

6 **Response:** No public hearing or meeting was held regarding the draft PEA. Despite the
7 fact that a specific comment period is not required by NEPA, the Bureaus agreed to publish the
8 draft PEA and provide a 30-day public comment and review period, affording the public
9 sufficient opportunity to participate. The Bureaus determined that as a public meeting is not
10 required by NEPA during the preparation of an Environmental Assessment and the public was
11 already afforded adequate opportunity to provide written comments on a technical document, the
12 public participation goals of NEPA were being more than adequately met.
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15 **Issue 1.2: Extend Comment Period**

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17 Commenters on this issue requested an extension of the comment period for the Draft
18 PEA (e.g., a 30-day extension) in order to allow the public an adequate opportunity to participate
19 in the NEPA process. The main reason given for the extension was that the Draft PEA presents
20 complex technical issues that require additional time to review and evaluate.
21

22 **Response:** The Bureaus determined that an extension of the comment period was not
23 warranted. The Bureaus concluded that the public was afforded sufficient opportunity to
24 participate in this NEPA process and provided even more than what is required specifically for
25 EAs by NEPA. The Bureaus further determined that extending the comment period would
26 interfere with the commitment agreed to by all parties in two lawsuits to issue the Final PEA by
27 May 28, 2016. The Bureaus entered into settlement agreements with the Center for Biological
28 Diversity (CBD) and the Environmental Defense Center (EDC), filed on January 29, 2016, in the
29 U.S. District Court for the Central District of California. The settlement agreements are in
30 connection with separate lawsuits filed by CBD and EDC regarding the Bureaus' compliance
31 with NEPA in BSEE's issuance of APDs and APMs approving the use of WSTs, as well as
32 Bureau compliance with other laws. Under the settlement agreements filed with the court, the
33 Bureaus are required to prepare a PEA addressing environmental impacts of offshore well
34 stimulation in Federal waters off California, provide a 30-day comment period on the draft
35 analysis document, and issue the final PEA and a Finding of No Significant Impact (FONSI), if
36 such a finding can be made, by May 28, 2016. For these reasons, the Bureaus determined that
37 extension of the comment period was neither required nor warranted under the circumstances.
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40 **Issue 2: NEPA Analysis**

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42 Comments addressing issues related to NEPA fell into a number of categories: (1) the
43 adequacy of the NEPA analyses, (2) the basis for the Bureaus conclusions, (3) the
44 appropriateness and defensibility of assumptions and conclusions in the PEA, (4) the need for an
45 EIS, and (5) the need to develop more clear and appropriate purpose and need for the proposed
46 action.

1 **Issue 2.1: Adequacy of Analyses**

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3 A number of commenters addressed the adequacy of the overall PEA analysis.
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6 **Issue 2.1.1: Arbitrary and Capricious Conclusions**

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8 Several commenters felt that the conclusions that offshore fracking and acidizing will
9 have negligible impacts on or risks to the environment are arbitrary and capricious. They
10 indicated they believe that the PEA illogically concludes that there would be no large
11 environmental risks or impacts, and that they believe it relies on incorrect assumptions and
12 inaccurate and unsupported data. Some commenters stated that the contention that Alternative 4
13 (prohibiting WST use) would have greater impacts than the use of WSTs because it may lead to
14 new wells and increased WST use onshore or importing more oil and gas is not supported. One
15 commenter said that data should be included to support the Bureau's conclusion that the release
16 of WST chemicals via existing fractures and faults is not reasonably foreseeable. Another
17 commenter felt that the Bureau's analyses support private interests' optimistic projections, and
18 that these analyses were framed in such a way as to support the predetermined outcome for
19 allowing offshore fracking and acidizing. One commenter felt that the Bureaus narrowly
20 interpreted Outer Continental Shelf Lands Act of 1953 (OCSLA) to limit the scope of the
21 analysis. Finally, several commenters felt that the Bureaus are ignoring their legal duty to
22 carefully consider the direct and indirect risks and impacts of WST use, and instead of protecting
23 California's resources want to resume "rubber-stamping" use of these techniques, which the
24 commenters consider unacceptable and unlawful.
25

26 **Response:** The Bureaus stand by the conclusions provided in the document, while noting
27 that the PEA is not itself a decision document for whether and how to proceed with WST use on
28 the OCS. BOEM and BSEE used the best available scientific information to conduct a
29 comprehensive review of the potential environmental impacts related to the WSTs considered in
30 the PEA. The PEA analyses show that there are no major environmental impacts associated with
31 any of the alternatives considered. While the Bureaus acknowledge that the terms "WSTs" and
32 "hydraulic fracturing" are controversial with the public, particularly with regard to much more
33 frequent and larger examples of WST use onshore, such public controversy does not change the
34 scientific information regarding the more infrequent and smaller-scale WSTs used on the POCS.
35 The scientific analysis of the projected WSTs on the POCS and the potential impacts must be
36 applied impartially, and such was the intent of the Bureaus in preparing this PEA. General
37 statements of dissatisfaction by the commenters with the analyses do not assist the Bureaus in
38 providing any supplemental analysis that could assist the public in understanding the potential
39 environmental impacts of the WSTs addressed by the PEA. To the extent that comments raised
40 specific concerns or provided scientific information, they are addressed in responses below,
41 particularly those in response to Issue Category 4, Environmental Concerns.
42

43 Regarding Alternative 4, the language contained in Section 4.5.4.3 of the PEA provides a
44 discussion of cumulative impacts specific to this alternative, presenting a brief comparison of the
45 potential impacts of using WSTs at existing wells as opposed to drilling new wells or enhanced
46 wells onshore or offshore. Section 4.5.4.3 of the PEA has been revised to help clarify this

1 comparison. Regardless, this portion of the analysis, either in original or revised format, will not
2 change the overall characterization of the environmental impacts of the alternatives, including
3 Alternative 4.

6 **Issue 2.1.2: Cursory Analysis Lacking Scientific and Analytical Integrity**

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8 Some commenters stated that the Draft PEA presented only a cursory analysis that is
9 flawed and inconclusive, lacks scientific and analytical integrity, fails to fully disclose the
10 environmental impacts, and fails to meet the legal requirements of NEPA. Other commenters felt
11 that the PEA fell short of providing a sufficiently complete evaluation to protect public health
12 and the environment. One commenter indicated that the PEA is inadequate to address the broad
13 range of issues at hand, and fails to substantiate its generalizations with documented facts, while
14 another commenter stated that the PEA does not analyze the alternatives in comparative form.
15 Some commenters called for the final PEA to more carefully and adequately analyze the impacts
16 of WST operations and honestly complete the more thorough environmental review required by
17 law, while others stated that additional analyses and supporting documentation would be needed
18 before any FONSI could be supported.

19
20 **Response:** BOEM and BSEE used the best available scientific information to conduct a
21 comprehensive review of the potential environmental impacts related to the WSTs considered in
22 the PEA. The analyses show that there are no major environmental impacts associated with any
23 of the alternatives considered. Public controversy over the decision to use hydraulic fracturing
24 and other WSTs (particularly for onshore applications that are more frequent and much larger in
25 scale than those projected for the POCS) does not change the scientific information and analyses
26 of such potential impacts. General statements of dissatisfaction with the analyses do not assist
27 the Bureaus in providing any supplemental analysis that could assist the public in understanding
28 the potential environmental impacts of the well stimulation treatments. To the extent that
29 comments raised specific concerns, they are addressed in responses below, particularly in those
30 responding to Issue Category 4, Environmental Concerns.

33 **Issue 2.1.3: Lack of Project Area and Baseline Data and Information to** 34 **Substantiate Conclusions**

35
36 Some commenters stated that the PEA contains no baseline data or fails to properly
37 define the baseline. One commenter indicated that the PEA does not delineate the actual project
38 area and does not describe impacts extending beyond the project area. Another commenter stated
39 that the PEA fails to adequately acknowledge the unique environmental, economic, and social
40 importance of the Santa Barbara Channel, the risks posed to the Channel and coastline by
41 offshore fracking and acidizing, and avoidance or minimization of the risks. Another comment
42 indicated that resources specific to those areas where WST use is most likely to occur should be
43 evaluated.

44
45 **Response:** The project area evaluated in the PEA is fully described in Chapter 3 of the
46 PEA, Affected Environment. Baseline information regarding resources in the project area is

1 presented in this chapter, with information provided on the status of specific resources of the
2 area, including geology, air, water, benthos, fish and wildlife, social and economic
3 considerations, areas of special concern, and archaeological resources.
4

5 The scope of the PEA includes the potential geographic extent of environmental impacts,
6 which varies depending on the type of impact factor and the resource, and potential impacts
7 within the project area are discussed thoroughly in Chapter 4 of the PEA. For example, for the
8 air quality analysis, the area of potential effects took into consideration not only air emissions
9 within the immediate vicinity of the activities but also whether there was the potential for
10 onshore impacts. In contrast, due to the mixing zone determined for water discharges, the area of
11 potential effects was likely much nearer to the activities. The map of the project area is shown in
12 several places throughout the PEA—for example, page 1-2—and provides a broad look at the
13 project area and the surrounding vicinity. The information in this map is augmented, when
14 appropriate, by a number of maps and figures in Chapters 3 and 4 and specific to individual
15 resources in the project area.
16

17 The PEA considered the potential environmental impacts of WSTs specific to the Santa
18 Barbara Channel and other areas in the vicinity of existing oil and gas production in the POCS.
19 The analyses did take into account the unique environmental and social attributes of the area.
20 Further, the PEA considered a range of alternatives to the proposed action, including several that
21 would result in different, sometimes lower, environmental impacts. BOEM and BSEE took all of
22 this information into consideration in the PEA.
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25 **Issue 2.1.4: Faulty Assumptions Regarding Future WST Use—Several Future Use** 26 **Scenarios Should Be Evaluated** 27

28 Some commenters stated that the PEA's assumption of a limited and infrequent future
29 use of WSTs is faulty, because future WST use rates may increase. One commenter suggested
30 that the apparent dismissal of effects due to assumed low levels of use together with WST waste
31 dilution following open ocean discharge does not assure that the PEA conclusions are warranted.
32 The commenter felt that it would be better to focus on the unknowns and uncertainties, and that
33 additional studies are needed to reach objective conclusions regarding safe levels of WST use on
34 the POCS. Another commenter felt that additional scenarios of future WST activity should be
35 examined, including those with greater use than present, or that the Bureaus should at least
36 define an assumed rate or range of use and specify that the PEA conclusions apply only to this
37 rate or range, and that significant future increases would require additional NEPA review. The
38 commenter asked that historical WST use be added to provide context, and that an analysis with
39 increased WST use be added, and this analysis should include an increased presence of WST
40 chemicals in produced water with an associated potential reduction in the level of dilution and an
41 increased generation and discharge of produced water.
42

43 **Response:** Section 4.1 of the PEA discusses the historical use of WSTs on the POCS and
44 adjacent State waters for perspective on the context and intensity of the activities. This
45 perspective is essential to understanding the magnitude of reasonably foreseeable future WST
46 use and environmental impacts in a programmatic NEPA analysis. The notion of any increase in

1 the use of well stimulation treatments is merely speculative at this time and consequently does
2 not lend itself to meaningful analysis. Moreover, because environmental review takes place prior
3 to any Federal approval of well stimulation, the review done at the time of a current proposal
4 would take into account the frequency of the proposed activities, if it is pertinent to
5 environmental impacts, and the ability to use this PEA at the time of the review of any specific
6 proposal. Any proposed WST use that falls outside of the scenario for this PEA (in either the
7 scope or the type of WSTs considered) would either require supplementation of this PEA or a
8 site-specific analysis to ensure that the Bureaus comply with their NEPA obligations. Therefore,
9 this PEA meets the requirements of NEPA by developing and evaluating a reasonable scenario
10 for WST use on a programmatic basis.
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13 **Issue 2.1.5: Use of SB-4 Definitions in the PEA**

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15 Several commenters expressed concerns regarding the adoption of State of California
16 SB-4 definitions of WSTs. One commenter stated that the PEA purports to arbitrarily adopt the
17 definitions that are found in SB-4, but that the SB-4 definitions are known to substantially differ
18 in scale, chemistry, and activity from those being used on land in California. The commenter
19 believes that it is inappropriate for the Bureaus to adopt the SB-4 definitions because doing so
20 does not allow for straightforward comparisons of WST in Federal and State offshore
21 applications. Another commenter raised a concern about the implied adoption of SB-4
22 definitions, and that State of California policy choices do not, and should not, constrain the
23 Federal government.
24

25 **Response:** Adopting the SB-4 definitions provides a useful tool for the description and
26 evaluation of the range of WST activities, including distinguishing WST operations from routine
27 operations. The Bureaus have attempted to include within the analysis in the PEA the range of
28 WSTs that are of concern to the public. In order to present information on these various
29 treatments in a manner that allows for consistent review and understanding by the public, the
30 Bureaus chose to adopt definitions used in SB-4. Without a standard definition, the Bureaus
31 expect that it would be more difficult for the public to understand the relative incidence and
32 impacts of the treatments on the POCS, as well as in comparison to WSTs performed in State
33 waters and onshore.
34

35 While several other potential definitions for WST activities have been offered by industry
36 and commenters, the Bureaus decided to use the SB-4 definitions for the PEA for a number of
37 reasons. First, the SB-4 definitions have become the standard way to identify well stimulation
38 activities in California since the law was enacted several years ago; therefore, for California
39 these definitions are commonly in use, are readily understandable to the stakeholders in the
40 region, and cover the bulk of WST activities reasonably expected in the area, both onshore and
41 off. Second, given the commonality of usage of the SB-4 definitions in California, these
42 definitions were the most useful for comparing impacts from POCS oil and gas WSTs to
43 State-authorized activities, both for the purposes of relative use and size of activities and for the
44 cumulative impacts analysis. In the years since SB-4 was enacted, a number of databases and
45 studies have become available that addressed offshore WST activities using SB-4 definitions,
46 especially with respect to the area of analysis. For the purposes of incorporating this data and

1 information into the PEA, the Bureaus felt it was reasonable and necessary to rely on the
2 SB-4 definitions.

3
4 Finally, as noted previously, the Bureaus have entered into settlement agreements with
5 two nongovernmental organizations (NGOs) regarding the NEPA analysis to be carried out in
6 the PEA (see response to Issue 1.2), and the parties agreed that the use of SB-4 definitions would
7 be appropriate for this PEA. For all of these reasons, although they acknowledge that other
8 definitions may be available, the Bureaus determined that the SB-4 definitions were the most
9 useful for determining potential impacts from POCS oil and gas activities related to well
10 stimulation and for the cumulative impacts analysis, considering among other things,
11 State-authorized WST activities.

12
13 Nevertheless, the Bureaus included an analysis of more routine well cleanup activities
14 (including acid use) in their No Action alternative, acknowledging that activities not meeting the
15 definition of SB-4 WSTs may also be proposed and are part of the baseline conditions and
16 activities that would be ongoing in the POCS whether WSTs are authorized or not. These
17 activities were also analyzed for their potential significance under this PEA. Any request to drill
18 or modify a wellbore and completion, whether meeting the SB-4 definitions or not, would
19 require a BSEE-issued Application for Permits to Drill (APD) or Modify (APM). At such a time,
20 an environmental review is completed, including an analysis of the supporting NEPA
21 documentation. Although for the purposes of its NEPA analysis in the POCS region the Bureaus
22 determined that the SB-4 definitions were the most useful for evaluating potential impacts, these
23 definitions do not constrain the Bureaus' oversight of activities requiring an APD or APM.

24 25 26 **Issue 2.1.6: PEA Analysis is Adequate**

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28 One commenter indicated that the Draft PEA appropriately considers only activities and
29 potential impacts directly related to offshore WSTs and correctly documents the small effects of
30 WST use. Another comment stated that the PEA takes a thorough and objective approach and
31 adequately addresses the chemical components of WST fluids appropriately.

32
33 **Response:** The Bureaus take this comment under advisement. The Bureaus have
34 complied with their NEPA obligations by developing this PEA to consider the WST activities
35 and their potential impacts reasonably foreseeable under this programmatic approach.

36 37 38 **Issue 2.2: A FONSI Is Not Warranted and There Is a Need for an Environmental Impact** 39 **Statement (EIS)**

40
41 Some commenters stated that the PEA, as a whole, provides insufficient evidence to
42 support the finding that WST poses negligible risks. Commenters stated that a FONSI cannot be
43 issued because the PEA is legally deficient; they believe it fails to adequately evaluate all direct,
44 indirect, and cumulative impacts (as described for Issue Category 2.1 above), and as a result is
45 insufficient to support a FONSI. Commenters also stated that the PEA cannot conclude that the

1 National Pollutant Discharge Elimination System (NPDES) permit is sufficient to justify a
2 FONSI determination because monitoring under the permit is not adequate.

3
4 Several commenters stated that because of the inconclusive results and incomplete
5 consideration of WST practices provide in the PEA, it would be prudent to follow up with a
6 complete EIS before resuming WST use on the POCS. Some commenters stated that the Bureaus
7 must prepare an EIS that includes a more detailed, thorough, and comprehensive analysis with
8 full evaluation and disclosure of the risks and impacts of offshore WST use on human health,
9 marine life, ecosystems, and coastal communities. Commenters also stated that WST flowback
10 fluids should be analyzed and their composition presented in an EIS. A commenter stated that an
11 EIS must be prepared to avoid setting a precedent for allowing WST use on other POCS areas
12 without adequate analysis. Commenters stated that a thorough assessment must be used to prove
13 the safety of WST use, and the PEA is an inadequate mechanism.

14
15 Other commenters stated that an EIS must be prepared that acknowledges the significant
16 environmental impacts and risks. Commenters felt that an EIS must be prepared because offshore
17 fracking and acidizing have serious adverse impacts, including cumulative impacts, that affect
18 public health and safety, affect unique geographic and cultural areas, constitute a substantial
19 public controversy, involve substantial data gaps regarding impacts, may significantly impact
20 Federally protected species, and threaten a violation of the OCSLA regulations requiring
21 production be balanced with protection. One commenter also felt that the Bureaus' proposal to
22 allow offshore fracking and acidizing meets every NEPA significance factor and thus clearly
23 triggers the Bureaus' duty to prepare an EIS. An additional comment suggested that in areas such
24 as the Santa Barbara Channel, even allegedly minimal environmental risks can be considered
25 significant enough to compel the need for an EIS.

26
27 **Response:** BOEM and BSEE used the best available scientific information to conduct a
28 comprehensive review of the potential environmental impacts related to the well stimulation
29 treatments considered in the PEA. Although in some cases reviewers noted areas where more
30 information could be gathered, particularly with regard to composition of wastewater through
31 enhanced monitoring, the information currently available is sufficient for the Bureaus to draw the
32 conclusions regarding levels of impacts. The analysis shows that there are no major
33 environmental impacts reasonably foreseeable with any of the alternatives considered; therefore
34 a FONSI remains appropriate. Public controversy over the use of fracking and other WSTs,
35 particularly for the types and magnitude of WSTs used onshore, does not change the science or
36 conclusions for the types, frequency, and size of WSTs reasonably foreseeable on the POCS as
37 evaluated in this PEA. Consequently, there would be no need for, and no benefit derived from,
38 preparation of an EIS. This PEA has served its NEPA purpose in determining that there are no
39 potential significant environmental effects, a FONSI is appropriate, and therefore no EIS is
40 required (see 43 CFR 46.325). Further analysis would be unnecessary and redundant, and would
41 provide no further substantive information.

42
43 As noted below (in the response to Issue 2.5), the scope of this PEA is limited to
44 reasonably foreseeable activities on the POCS. This PEA therefore is not directly applicable to
45 other decisions on WSTs outside the scope of this PEA. While the analyses may be similar and
46 referenced accordingly, the decision on whether to approve WSTs in other OCS regions must be

1 supported by NEPA applicable to those activities and regions, and the resources in that region.
2 For this reason, while certain analyses and activities may be similar for other regions, this PEA is
3 not a “precedent” for other activities proposed in other regions.
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6 **Issue 2.3: Revise the Purpose and Need Statement**

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8 Commenters addressing this topic suggested that the Bureaus revise the purpose and need
9 to clearly identify the underlying purpose and need to which BSEE and BOEM are responding.
10 One commenter felt that the statement of need describes the proposed action, and would be more
11 accurately represented as the goal (e.g., to increase production, increase economic viability). A
12 number of commenters stated that the purpose and need fails to meet the legal requirements of
13 NEPA and is driven by the desire of oil company lessees to conduct offshore fracturing and
14 acidizing. Some commenters felt that the actual purpose of the PEA is to consider for the first
15 time the potential environmental impacts of offshore well stimulation, but that instead the stated
16 purpose and need presumes that it can be done safely, in conformance with governing laws, and
17 that the Bureaus have an obligation to promote its use; thus the purpose and need as stated calls
18 into question the overall objectivity of the PEA. Other commenters felt that the purpose and need
19 is too narrow and prescriptive, and implies a predetermined solution; that it should rather allow
20 for evaluation of the full range of reasonable alternatives and not, itself, propose a solution.
21 Some commenters also stated that offshore wells do not need WSTs to be productive, and
22 indicated that the PEA implies that it is the responsibility of the Federal government to promote
23 enhanced extraction at the expense of promoting protection of natural resources and public
24 health.
25

26 **Response:** Given the number of comments for this issue, it became clear to the Bureaus
27 that the draft PEA was confusing in how it characterized the purpose and need of the proposed
28 action. Therefore, the Bureaus have redrafted the purpose and need (see Section 1.2 of the PEA)
29 to clarify and more clearly identify the purpose of WSTs (i.e., to enhance the recovery of
30 petroleum and gas from certain existing and new POCS production wells) and the need of the
31 activities (i.e., to produce additional O&G feedstocks for energy production and development of
32 various hydrocarbon products).
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35 **Issue 2.4: Consistency of Analyses**

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37 One commenter stated that the assumption of infrequent WST use is directly at odds with
38 other statements made throughout the draft PEA that the use of offshore WST is allowing the oil
39 industry to produce oil and gas from previously inaccessible reserves and is prolonging the life
40 of offshore platforms.
41

42 **Response:** WSTs are used infrequently in the POCS. See Section 4.1 of the PEA for
43 more information. As noted therein, WSTs have been used fewer than 30 times over decades of
44 oil and gas activities on the POCS. Even in the year with the highest use of WSTs at different
45 platforms (1997), fewer than five WSTs were undertaken. Even with the use of WSTs, oil and
46 gas production is still declining on the POCS. For example, the average daily production of oil

1 from the POCS has steadily declined from a peak in 1995 of about 200,000 bbl per day to about
2 39,000 bbl per day in 2015. In more recent years, there have been only one or even no WSTs
3 applied per year. For this reason, the Bureaus determined that a scenario of up to five WSTs per
4 year was likely an overestimate of proposals on an annual basis going forward, but remained
5 reasonably foreseeable for purposes of this programmatic analysis. The issue of prolonging or
6 extending the “life” of an offshore platform is addressed in response to Issue 10, below. As noted
7 there, platform life is not related to frequency of WSTs.
8
9

10 **Issue 2.5: Scope of Analyses Should or Should Not Include Other OCS Areas**

11

12 One commenter indicated that it is important to clarify that the scope of the PEA is
13 limited to the POCS, as some of the supporting data and recommendations in the PEA are
14 specific to this region and may not be applicable to other areas such as the Gulf of Mexico. Other
15 commenters argued that the scope of this EA should not be limited to WST activities on the
16 POCS, but should be a national programmatic EA for all prospective WST use on the OCS.
17

18 **Response:** The Bureaus stated consistently throughout the PEA that the information in
19 the PEA is specific to the POCS. The Bureaus considered the proper geographic scope of the
20 PEA and determined that it would not be possible or practical to complete an analysis on a
21 national scale given the breadth of resources to be analyzed and vast differences in geographic
22 areas and activities (e.g., the Arctic environment in the Alaska OCS region versus the marine
23 environment of the Gulf of Mexico OCS region). It is within the discretion of the action agency
24 to consider similar actions together in a single NEPA document where similarities provide a
25 basis for evaluating environmental consequences together, such as common timing or geography
26 (see 40 CFR 1508.25). On the basis of similarity of activities and geography, the Bureaus
27 determined that a programmatic approach for WSTs on the POCS was reasonable. However,
28 given major differences in the geography and resources of other OCS regions, such as the Arctic
29 and the Gulf of Mexico, no such commonality exists for WSTs proposed in those areas.
30 Therefore, the Bureaus determined that such an approach was not reasonable for this PEA.
31 Nevertheless, any decision on WSTs in other OCS regions will be supported by separate NEPA
32 analyses specific to the types and magnitude of WSTs proposed there and the resources native to
33 the region. Therefore, while this PEA is specific to the POCS region and will be a basis for
34 decisions on WST use in that region, WST use in any OCS region managed by the Bureaus will
35 be subject to separate NEPA review as appropriate.
36
37

38 **Issue 3: Alternatives Considered in the PEA**

39

40 Some commenters felt that additional alternatives should be examined in the PEA, while
41 others expressed preferences for specific individual alternatives.
42
43

1 **Issue 3.1: Need for Additional or Other Alternatives**

2
3 One commenter believed that the Draft PEA unlawfully constrained the consideration of
4 alternatives, and that other alternatives that further restrict WST use would be more
5 environmentally protective and more likely to meet the project's proper purpose, which should
6 be to demonstrate that offshore WSTs can safely occur. Some commenters felt that the PEA does
7 not address the full range of proposed techniques and other associated practices. One commenter
8 indicated that the PEA attempts to distinguish between fracturing and non-fracturing WSTs and
9 does not consider the commonalities and differences of the chemicals utilized in them, while
10 another stated that the analyses are limited to too few fracturing and non-fracturing WSTs. Yet
11 another commenter indicated that the PEA should discuss how WST practices have changed over
12 time, to improve understanding of potential environmental impacts. Some commenters also felt
13 that the Draft PEA provided an inadequate range of alternatives, and did not rigorously explore
14 and objectively evaluate all reasonable alternatives, including consideration of other more
15 ecologically sound courses of action such as shelving the entire project, spatial and temporal
16 constraints on WSTs, setting limits on the number of WSTs per year, conducting testing before
17 WSTs to demonstrate environmental safety, or accomplishing the same results by an entirely
18 different means.

19
20 **Response:** The NEPA regulations require agencies to explore and evaluate a reasonable
21 range of alternatives, and to briefly discuss reasons for eliminating alternatives from detailed
22 study. The Final PEA includes this discussion in Chapter 2. Chapter 4 of the Final PEA includes
23 a comparative analysis of environmental impacts among the alternatives. Four alternatives
24 received detailed study, while three were eliminated from that review for the reasons stated in the
25 PEA. There were no commenters who proposed that the PEA include a wider range of
26 alternatives that also suggested an additional alternative for review that would lend itself to
27 meaningful analysis. Others suggested alternatives that were already included and fully analyzed
28 (e.g., "shelving the project," which is the No Action Alternative). Therefore, the Bureaus
29 continue to believe that the range of alternatives they considered constitutes a reasonable range
30 for the purpose of this PEA, consistent with the scenarios of reasonably foreseeable types of
31 WSTs that may be used on the POCS and the programmatic nature of the document.

32 33 34 **Issue 3.2: General Preference for an Alternative**

35
36 One commenter supported Alternative 3 as an appropriate alternative to the proposed
37 action (disposal of well stimulation treatment fluids and produced water through underground
38 injection rather than discharging into the ocean). Another commenter supported Alternative 3,
39 although the commenter may have actually meant Alternative 4, as they indicated they wanted
40 no WST use and stated that fossil fuels should be kept in the ground.

41
42 Several commenters specifically expressed a preference for Alternative 4 (the "no
43 fracking," or No Action Alternative). Some felt that this alternative would be most protective of
44 the environment and human health and safety. Another commenter stated that, pending further
45 studies on the effects of WST discharges on the marine environment, Alternative 4—or, at a
46 minimum, one of the other alternatives that prohibit open-water discharges or eliminate well

1 stimulation treatment use in the upper 2000 ft. of the seafloor—should be the preferred
2 alternative.

3
4 Several commenters expressed support for Alternative 1 (the proposed action). One
5 commenter supporting Alternative 1 stated that the industry’s track record for offshore WSTs is
6 sound and that the risks are well understood and manageable, while another agreed with the
7 conclusions reached in the Draft PEA. Some commenters supporting Alternative 1 also
8 expressed opposition to the other alternatives, feeling that the other alternatives would limit
9 production from existing wells and potentially increase the need for additional wells.

10
11 **Response:** The Bureaus will take these comments under advisement. However, the PEA
12 itself is not a decision document; it is a programmatic analysis. Each proposal to use WSTs on
13 the POCS will be individually reviewed and BSEE will make a decision on whether or how to
14 approve each proposal at such time.

15 16 17 **Issue 3.3: Revise the Definitions of the Alternatives, Including the Proposed Action and** 18 **Descriptions of the Procedures**

19
20 Several commenters requested additions and clarifications to the PEA related to the
21 definitions of the alternatives, as well as additional information on Bureau procedures that would
22 be associated with implementation of each of the alternatives. One commenter provided specific
23 recommendations for describing procedures and actions allowed (or not allowed) under the
24 various alternatives. Another commenter requested clarification of what changes the Bureaus
25 would make in their regulatory programs under Alternative 4, and clarification about whether the
26 proposed action (Alternative 1) would result in additional requirements prior to WST approval
27 (similar to those required by SB-4). Another commenter requested a better description of how
28 WSTs have changed over time, and particularly how current practices may differ from those
29 originally contemplated under most of the POCS platform plans and the NPDES general permit.
30 Another commenter requested clarification on whether use of other WSTs not evaluated in the
31 PEA would be restricted or prohibited, or whether the composition of allowed WSTs would be
32 restricted in some manner. The commenter also requested that the Final PEA clarify the nature of
33 the referenced performance standards.

34
35 **Response:** Chapter 2 of the PEA, regarding the descriptions of the proposed action and
36 alternatives, has been revised for clarification in response to the various comments received. As
37 noted above, however, this is a programmatic document; any proposal to use WSTs outside of
38 what is considered herein must be supported by NEPA analysis. At the time of any such
39 proposal, the Bureaus will determine whether supplementation of the PEA is warranted or the
40 analysis can be addressed during the site-specific review of the proposal.

41 42 43 **Issue 4: Environmental Concerns**

44
45 A large number of commenters expressed concerns associated with the environmental
46 impacts of WST use, and especially the effects of WST-related chemicals on human health and

1 the environment (including biota, water quality, and air quality). Commenters expressed
2 concerns about toxic effects of leaked or discharged WST-related chemicals on marine biota and
3 seabirds (including species listed under the Endangered Species Act) as well as on human health.
4 Several commenters provided information related to the toxicity of chemicals used by the WSTs,
5 identifying potential effects ranging from cancers and mutations, immune and nervous system
6 damage, and birth and developmental effects, as well as degrading habitats. Others expressed
7 concern that injection of WST waste fluids could contaminate drinking-water aquifers and
8 irrigation water supplies for agriculture. Several commenters expressed concern that injection of
9 WST-waste fluids could in result in an increase in earthquakes. Commenters also expressed
10 concerns about the consequences of WST-related accidents, including oil spills. One commenter
11 expressed concern that wastewater containing WST chemicals will migrate into State waters, and
12 that the proposed action undermines California's actions and future ability to protect its coastal
13 resources and public health. Some commenters felt that WST use has the potential for large loss
14 of marine life from billions of gallons of wastewater and chemicals, and thus the use of WSTs is
15 unacceptable.

16
17 Some commenters believed that, because the POCS wells are located in the heart of an
18 environmentally sensitive area—including the Santa Barbara Channel, which contains abundant
19 marine life including endangered species—the lack of knowledge regarding the effects of WST
20 chemicals is cause for concern. Commenters felt that offshore hydraulic fracturing and acidizing
21 have substantial impacts and risks, including spills, accidents, and earthquakes, which could
22 negatively impact unique and significant areas such as the Channel Islands Marine Sanctuary, the
23 Channel Islands National Park, and the many marine protected areas in the waters of the project
24 area. One commenter felt that WST use poses a risk to Chumash ancestral areas, submerged
25 Chumash remains, and sacred Chumash natural cultural marine resources such as dolphins and
26 abalone, and undermines the Chumash Peoples' ability to protect their coastal resources and
27 cultural heritage.

28
29 **Response:** The Bureaus included the scope of reasonably foreseeable activities and their
30 environmental effects in this PEA, commensurate with the appropriate level of detail required
31 under NEPA and to determine the level of potential impacts. The Bureaus acknowledge in the
32 PEA the toxicity of many of the components of WST fluids and potential hazards associated with
33 WST use in oil and gas production. The Bureaus also acknowledge the importance of public
34 concern regarding these issues. Concern for public health and safety and environmental
35 stewardship are also at the core of both Bureaus' responsibilities and regulatory activities. For
36 example, the Bureaus ensure that aquifers are not accessed by wastewater injection, and
37 environmentally sensitive areas and resources are given appropriate consideration. Air quality
38 and water quality are addressed under a variety of Federal and State regulations and directives,
39 and BSEE has multiple review and enforcement functions for environmental protection and
40 worker safety. Issue 4.1 addresses resource-specific comments related to the Draft PEA analysis,
41 and responses to comments related to toxicity are presented there. Consultation with Native
42 American tribes is addressed in the response to Issue 15.1.

43
44

1 **Issue 4.1: Adequacy of Resource-Specific Analyses**

2
3 Several commenters expressed concerns that the PEA failed to take a hard look at the
4 impacts of WST use on marine life, water quality, air quality, and human health. Some
5 commenters stated that an economic analysis should be included. One commenter requested that
6 oil recovery be added as a beneficial socioeconomic impact. Another commenter stated that the
7 claim that archaeological resources would not be affected must be substantiated.
8

9 **Response:** Risks from chemical exposure are a function of the magnitude of exposure
10 (e.g., the concentration of a chemical) a resource or human receptor is likely to experience,
11 together with a consideration of what that the length of exposure is likely to be (e.g., duration
12 and frequency of the exposure) and whether it reaches or exceeds a level that may pose a threat
13 to human health and the environment. The analyses in the Draft PEA considered both factors. On
14 that basis, a determination was made that there would be little or no significant adverse effects
15 from exposure to WST-related chemicals and fluids during reasonably foreseeable WST
16 activities on the POCS. Workers would be protected under U.S. Coast Guard requirements, and
17 exposure concentrations for biota and sensitive areas are expected to be below levels of concern.
18

19 The analyses of impacts on marine life, water quality, and air quality are rigorously
20 evaluated and discussed in Ch. 4 of the PEA. Impacts on human health are discussed in the PEA
21 in Section 4.5.1.9. Additional analyses have been added throughout Section 4.5 of the PEA to
22 provide further information regarding likely exposure levels to WST-related chemicals and
23 fluids, including reference to discharge monitoring reports and the likely mixing zones relevant
24 to WST activities. Socioeconomic analyses are included in Section 4.5.1.10. Because of the
25 anticipated infrequent use of WSTs, the existing oil and gas infrastructure on the POCS for
26 several decades, and the distance of activities to shore, the socioeconomic impact analysis
27 provided in the PEA is appropriate given any potential impacts are not likely to be discernible.
28 Analysis of impacts on archaeological resources is provided in Section 4.5.1.7 of the PEA, and
29 the conclusion that archeological resources would not be affected is appropriate because no new
30 seafloor or ground-disturbing activities (which are the primary modes of impact on archeological
31 resources on the POCS) are expected under the proposed action.
32
33

34 **Issue 4.1.1: Impacts on Ecological Resources Not Adequately Evaluated**

35
36 A number of commenters felt that the PEA failed to fully assess the impacts of WST
37 chemicals on marine and coastal biota. Some commenters attributed the level of analysis in the
38 PEA to the Bureaus deferring to regulatory compliance with the Clean Water Act and to the
39 reliance on unsupported conclusory statements such as a low concentration of chemicals in
40 wastewater and neutralization of acidizing chemicals. Some commenters stated that the PEA
41 does not analyze impacts from routine WST use on marine life within the 100-m mixing zone.
42 Several commenters felt that the analysis of discharge toxicity is inadequate because it lacks
43 information regarding the composition and toxicity of WST flowback fluids that contain
44 constituents mobilized from the formation. These commenters stated that impacts cannot be
45 sufficiently evaluated unless the composition and toxicity of flowback fluids are known. Some

1 commenters requested that studies supporting the statements in the ecotoxicity discussion
2 regarding discharged flowback fluids be cited in the PEA.

3
4 Some commenters felt that the PEA does not provide direct evidence of lack of impacts
5 on ecological resources, but that it relies on the California Council on Science and Technology
6 report (CCST 2015), which acknowledges a lack of data. Commenters felt the PEA does not
7 assess lethal, sublethal, or displacement impacts on marine and coastal biota following WST-
8 related wastewater disposal or from accidental releases of WST fluids or hydrocarbons. Some
9 commenters also felt that the PEA did not adequately assess contamination of critical habitat or
10 impacts from bottom-disturbing activities. Commenters argued that the geographic range of
11 impacts was also not estimated; for example, which Areas of Special Concern and which species
12 could be affected are not identified. Some commenters requested that results be added for
13 chronic whole effluent toxicity (WET) testing to support the conclusion of no impact on
14 organisms, and indicate whether bioaccumulating contaminants occur in WST fluids. Other
15 commenters requested that the PEA address chronic and indirect effects of WST discharges
16 under low and high WST use scenarios, and that the PEA assess potential effects on benthic
17 organisms, including accumulation in biota and ecosystems, from adsorption of WST chemicals
18 to solid phases and removal to the seafloor.

19
20 **Response:** See Issue 4.1 above Issue 7 below for responses to comments related to the
21 toxicity of WST fluids, including within the NPDES designated discharge mixing zone and areas
22 outside of the zone. As noted in the responses to those issues, additional analyses have been
23 added to Section 4.5; these provide further discussion regarding likely exposure levels to WST-
24 related chemicals and fluids, including discharge flowback fluids. The PEA considered the
25 potential for WST use to impact ecological resources throughout the project area, and identified
26 only localized and insignificant effects in the vicinity of individual platforms; Areas of Special
27 Concern were evaluated and no discernable impacts on any such areas were identified (see
28 Section 4.5.1.6 of the PEA). As noted in the PEA, no bottom-disturbing activities (which may
29 affect seafloor habitats and aquatic biota) are anticipated with WST use on the POCS. Comments
30 related to accidental releases are addressed in the response to Issue 6.

31 32 33 **Issue 4.1.2: The PEA Does Not Adequately Evaluate Impacts on Water Quality**

34
35 Several commenters on this issue stated that the PEA fails to take a hard look at the
36 impacts of WST chemicals on water quality because of regulation by the Clean Water Act and
37 reliance on unsupported conclusory statements such as a low concentration of chemicals in
38 wastewater and neutralization of acidizing chemicals. One commenter stated that the Bureau's
39 analysis relies on the U.S. Environmental Protection Agency (EPA) permit, a non-NEPA
40 document, as a basis for its no impact conclusion but that under NEPA they must conduct their
41 own independent analysis. Some commenters stated that the PEA does not analyze impacts on
42 water quality from routine WST use within the 100-m mixing zone, and that it fails to address
43 potentially significant impacts on water quality when it relies on a flawed assumption that
44 previous results from WET testing in the POCS, which is infrequent and not tied to discharges,
45 has not demonstrated impacts from WST operations. Some commenters felt that because the
46 water quality analysis is qualitative and focuses on the mixing zone, the analysis largely ignores

1 the effect of wastewater plumes; these commenters asked for a quantitative assessment of ocean
2 discharge, including expected dilution factors, the fate of acidic discharges, and how the plume
3 will comply with benchmark criteria. Some commenters felt that the PEA does not disclose how
4 pollution from these projects would affect regional and municipal water quality issues and
5 monitoring stations, and that the PEA did not consider the potential of WST to induce
6 unstoppable artificial oil seeps, or potential effects on groundwater basins and aquifers from
7 injection. The CBD submitted two publications from the USGS reporting on water quality and
8 wastewater injection disposal in West Virginia. Commenters also stated that the PEA lacks an
9 analysis of impacts of the discharge of flowback fluids on water quality, fails to support a
10 conclusion of no WST-related impacts, and fails to disclose the range of impacts from acid
11 fracturing.

12
13 A commenter expressed concern that fracturing fluids used in a diagnostic fracture
14 injection test (DFIT) may not closely resemble the normal fracking fluid mixture. The
15 commenter also stated that the Draft PEA failed to evaluate the relevant anticipated fracking
16 compounds, their toxicity and mutagenic properties, and the composition of the biocides and
17 surfactants used to aid fluid recovery.

18
19 **Response:** The water quality analysis in the PEA addresses anticipated constituents in
20 discharge fluids and conditions within and outside of the NPDES-specified 100-m mixing zone.
21 The analysis did not rely solely on the NPDES permit, but included an independent analysis
22 which is presented in Section 4.5.1.3 of the PEA. However, the NPDES permit remains a
23 limiting factor on the toxicity of discharges for POCS oil and gas activities (including WSTs)
24 and is therefore relevant. While the Bureaus conducted their own analysis, the analyses
25 published by EPA (designated by Congress as the expert Federal agency on water discharges
26 under the Clean Water Act) remain relevant, particularly where they specifically addressed
27 hydraulic fracturing activities. Additional information has been added to Section 4.5.1.3
28 regarding discharge flowback fluids. Constituents in monitored discharge are also addressed in
29 Issue 13.

30
31 The two studies provided by the CBD (Akob et al. 2016; Kassotis et al. 2016) examined
32 surface water quality in a stream near a wastewater injection disposal site in West Virginia. The
33 site is located in the vicinity of historic coal mining and O&G operations, and is currently used
34 as a wastewater treatment plant and includes wastewater injection disposal; the site receives
35 wastewater from unconventional O&G extraction (e.g., hydraulic fracturing and directional
36 drilling) as well as other industries (e.g., coal mining). Both studies identified elevated levels of
37 metals, radionuclides, and endocrine-disrupting chemicals in the surface waters of a stream
38 flowing through the site. However, the authors of these studies did not identify the source or
39 sources of the detected constituents, nor did they provide a definitive link to wastewater injection
40 and even less so to hydraulic fracturing; potential contaminant sources discussed in the studies
41 include wastewater from leaking surface impoundments, runoff from reclaimed surface mining
42 areas, acid mine drainage from a nearby coal mine, and fuel spills from vehicles associated with
43 facility operations. Because of the mixed sources of wastewater disposed of at this site, Kassotis
44 et al. (2016) cautioned against specifically extrapolating their results to unconventional O&G
45 activities. The Bureaus have reviewed these studies and find that they portray no scenario that is
46 reasonably related to offshore O&G production using WSTs, and that the information presented

1 in these studies does not contribute to the analysis in the PEA. To the extent that the studies
2 provide any information on specific chemicals that may be components of offshore WST fluids,
3 those chemicals are already discussed in the water quality assessment of the PEA.
4

5 Hydraulic fracturing additives used in a DFIT would not contain chemicals related to
6 proppant placement. Therefore, the potential effects of DFIT additives would be encompassed by
7 the analysis of effects of full-scale hydraulic fracturing WSTs, which are analyzed in the PEA.
8 The chemical additives used in WSTs, including biocides, and their potential toxicities are
9 analyzed in Section 4.5.1.3 of the PEA.
10

11 **Issue 4.1.3: The PEA Does Not Adequately Evaluate Impacts on Air Quality**

12

13
14 Several commenters felt that the PEA fails to take a hard look at the impacts WST
15 chemicals would have on air quality, and attributed this failure to compliance with Clean Air Act
16 regulations and to unsupported conclusory statements. The commenters also stated that the PEA
17 fails to describe impacts on air quality, such as those from photochemical ozone, visibility
18 degradation from particulate matter (PM) emissions, greenhouse gas (GHG) emissions, WST
19 fluids and hydrocarbons from accidents, and emissions during drilling of injection wells. Some
20 commenters requested that the PEA quantify the air emissions associated with increased service
21 vessel traffic, venting or flaring of gasses, WST fluid evaporation, and contributions to air
22 quality impacts from POCS oil and gas production. Commenters also asked that the PEA provide
23 support for the conclusion of negligible incremental emissions from on-land facilities.
24 Commenters also stated that comparing air emissions from WST use with California or offshore
25 oil and gas industry emissions is inappropriate for impact analysis, and they requested that the
26 Bureaus estimate GHG emissions directly from the project and from the consumption of WST-
27 produced oil and gas, and estimate methane emissions. Some commenters stated that the long-
28 term effects of continued WST use on the atmosphere have not been analyzed, and one
29 commenter recommended that the Bureaus update the information on air quality to reflect the
30 revised Federal 8-hr ozone standard. Some commenters also suggested that the PEA present the
31 air pollutant emissions from a worst-case scenario and compare that to a significance threshold,
32 and describe the types of emission controls to be used.
33

34 **Response:** The impacts of anticipated WST use on air quality are presented in
35 Section 4.5.1.2 of the PEA. The analysis indicates that WST use would have no noticeable
36 effects on regional air quality because of the expected infrequent use of WST, long-term effects
37 would be negligible. A further detailed quantitative analysis of impacts from associated
38 activities, such as service vessel use, is not warranted because of the anticipated infrequent use of
39 WSTs and the qualitative analysis provided in the PEA already shows that impacts on air quality
40 from the reasonably foreseeable WSTs would not be significant. There would be a nearly
41 indiscernible impact from the extended use of vessels and equipment (from mere hours to a day)
42 while a WST activity is implemented. Compared to the other emissions, both onshore and off,
43 these emissions would not reasonably be expected to result in any significant or even noticeable
44 increase in emissions. Updated information regarding the ozone standard has been added to
45 Section 4.5.1.2 of the PEA.
46

1 **Issue 4.2: Adequacy of the Cumulative Impact Analyses**

2
3 Commenters on this issue felt that the cumulative impacts analysis in the PEA is
4 conclusory, vague, and inadequate, and is based on the unfounded assumption that the direct
5 impacts of WST use are negligible, temporary, localized, and infrequent. Commenters felt that
6 the analyses need to include impacts of existing and future oil and gas infrastructure and
7 development, ocean acidification, harmful algal blooms, warming oceans, pollution, drift netting,
8 and oils spills. Some commenters also felt that the analysis should include baseline data, types of
9 chemicals released, surface and subsurface ocean currents, and reliable cleanup strategies. Some
10 commenters felt that the analysis evaluated cumulative impacts for only a very broad categories
11 of activities, lacked a quantified assessment, and did not provide insight into past, present, and
12 reasonably foreseeable future actions. Commenters also felt that the PEA disregards the
13 cumulative biological implications of the types of chemical compounds used.
14

15 **Response:** The scope of activities to be included under the proposed action are related to
16 WST use on the POCS; other activities are outside of the scope of this PEA, except as they relate
17 to the baseline environment and the cumulative impacts. Any future proposal for oil and gas
18 activities outside of the WSTs part of the scenario in this PEA would be subject to its own
19 review. The cumulative impact analysis considered the baseline data included in Chapter 3,
20 Affected Environment, which describes current conditions and past and ongoing impacts on the
21 resources that would potentially be affected by the activities included under each alternative, as
22 well as reasonably foreseeable future activities that should be taken into account. Because of the
23 estimated negligible to small impacts of the activities under the action alternatives and the small
24 contribution to total cumulative impacts, the description and types of analysis of all current and
25 reasonably foreseeable future impacts from other activities is appropriate in light of the
26 circumstances. However, text has been added to the cumulative impacts portions of Section 4.5
27 of the PEA to further clarify the cumulative contributions of WST use.
28
29

30 **Issue 5: Seismicity and Landslides**

31
32 Commenters on this issue expressed concerns that hydraulic fracturing can trigger
33 earthquakes (e.g., due to high injection pressures and the uncertainty in the location of many
34 faults). One commenter wanted the PEA to examine the risk of induced seismicity under future
35 scenarios with increased use of WSTs, and requested revising the PEA in order to examine
36 whether WST use (including frequencies above historical rates that would increase the volume of
37 produced water due to increased fluid recovery and/or extending the life of wells) would affect
38 the use of injection wells, and therefore the risk of induced seismicity. A commenter also stated
39 that wastewater injection would increase the seismicity risk (e.g., fracking could contribute to
40 increased stress in faults, thereby increasing the magnitude of naturally triggered earthquakes).
41 One commenter was also concerned that WSTs could affect historic landslides or create new
42 landslide issues. A small number of commenters also expressed their concern that an earthquake
43 could cause a tsunami.
44

45 **Response:** An analysis of the potential for induced seismicity, landslides, and tsunamis
46 resulting from injecting flowback fluids from WSTs into geologic formations was conducted and

1 presented in Section 4.5.1.1 of the PEA. The analysis indicates that the addition of WST
2 flowback fluids to total injection volumes of produced water from ongoing operations would be
3 minimal. A typical large offshore hydraulic fracturing treatment would add only 4,200 bbl of
4 injection fluid to an average well's annual injection volume of produced water of 214,000 bbl
5 (2013 volumes), which is an increase of only 2% for a single well. When compared to the total
6 annual produced water injection volume of 65 million bbl across all platforms in 2015, a large
7 WST would add only 0.006% to total annual injection volume, a vanishingly small increase. By
8 comparison, Statewide injection volume in Oklahoma in 2013 was about 160 million bbl per
9 month, with roughly half of this volume injected for enhanced recovery and half for dedicated
10 disposal. This disposal portion has been linked to induced seismicity in Oklahoma (Walsh and
11 Zoback 2015). On the POCS, all produced water injection in recent years has been for enhanced
12 recovery only. Given the historical very low frequency of fracturing WSTs on the POCS in the
13 past (see Section 4.1), and an expected similar level of use in the foreseeable future, total annual
14 injection volumes from WSTs at any individual platform or for the OCS as a whole are expected
15 to remain a very small fraction of total injection volume at a platform.
16

17 Moreover, most fluid injection wells on the POCS are used for pressure maintenance of
18 the reservoir or as part of a reservoir waterflood program, whereby produced water is injected at
19 the edge of the reservoir and "sweeps" the oil toward production wells. Reinjecting fluid back
20 into the formation from which it was produced would not be expected to induce seismicity, as
21 reinjection replaces water removed from the formation during oil and production and does not
22 increase formation pressure (Walsh and Zoback 2015). If the fluid is injected into non-producing
23 formations then it is considered disposal. Since 1985,³ as many as five wells drilled on the POCS
24 have been used for disposal in any single year, with the maximum amount of disposal fluid
25 reaching 700,000 bbl for all wells combined. Over the last 10 years the number of disposal wells
26 on the POCS has ranged from zero to three, with annual average total disposal volume of about
27 150,000 bbl for all disposal wells. BSEE records show that there has been no active disposal
28 (i.e., no disposal into non-producing formations) since 2014.
29

30 In onshore areas where increased seismicity has been observed in conjunction with
31 fracking-related injections, such injections are thought to expand formation volume and pressure,
32 which in turn has increased seismic activity. In areas such as Oklahoma where large-scale
33 hydraulic fracturing is common, produced water is often transported to Class II disposal wells
34 where large volumes of produced water from multiple wells are continuously injected. For
35 example, in areas of Oklahoma where there has been a marked increase in seismicity, volumes of
36 produced water injected into non-producing reservoirs between 2009 and 2013 have been in the
37 range of 140 to 180 million bbl monthly (Walsh and Zoback 2015). This level of disposal does
38 not occur in the POCS, where hydraulic fracturing is very infrequent (see Section 4.1 of the
39 PEA), high-volume multi-field disposal wells do not exist, and annual average disposal volumes
40 have been on the order of about 150,000 bbl. Further discussion along these lines has been added
41 to Section 4.4.1.1 of the PEA, which includes reference to a 2016 U.S. Geological Survey report
42 on induced seismicity related to onshore fluid injections from hydraulic fracturing operations.
43

³ Injection volumes were not tracked prior to 1985.

Issue 6: Inadequate Consideration of Accidents

One commenter suggested that, in the unlikely event of an accidental release of WST-related fluids, potential environmental impacts would be temporary and localized, because the volume and concentration of spilled fluids would be low. They further commented that although it could have larger impacts, the probability of a large-volume seafloor spill is very low. Other commenters stated that wastewater injection and high injection pressures used in WST can increase the risk of well casing damage and loss of integrity resulting in leaks and contamination, including oil spills, especially because of the age of OCS wells. They also indicated that accident rates, including spills, increase with infrastructure age because pipeline failures increase with age.

Response: As noted by some commenters, the PEA concluded that the likelihood of a large-volume seafloor release of hydrocarbons (a surface expression) resulting from an accident during WST operations would be very low and is considered not foreseeable (Section 4.3.2). The PEA analysis also found that accidents involving well cement failures resulting in a seafloor release would be highly unlikely and not reasonably foreseeable (Section 4.3.2). These conclusions would not change in the face of aging infrastructure for several reasons. O&G infrastructure undergoes continuous maintenance and integrity testing in accordance with BSEE regulations. In addition, well casings in POCS wells are infrequently pressurized, which reduces the probability of a casing or cement failure as a result of frequent pressurization events. Finally, even in the event of casing or cement failure, it is unlikely that a seafloor release of hydrocarbons and WST fluids would take place, given the lack of the natural formation pressure needed to drive the release to the seafloor surface following cessation of WST activities; release of injection pressure would occur quickly upon detection of a leak, and the absence of any other driving force that would move hydrocarbons at depth to the seafloor.

Issue 6.1: Analysis of Accidents Related to Cement or Casing Failures

A commenter stated that the PEA should note that even if a migration pathway were created in the cement in a well, it is unlikely that the hydraulic fracturing fluids would migrate upward, due to the density of the fluid. A commenter asked that the PEA provide data to demonstrate that casing failures are not reasonably foreseeable. Another commenter requested that the PEA discuss quantitatively how the data relied upon are representative of the age of the OCS wells. A commenter suggested the PEA should clarify whether or not the assessment of the potential for wellbore casing failure is based solely on WST use. A commenter also stated that there are two events that must occur simultaneously for an accidental release to occur, a casing failure and a cement failure, and that the latter is more related to installation issues than pressurization and depressurization. A commenter stated that the PEA fails to disclose parameters for determining whether well casings and other components have been designed to safely accommodate increased pressures of WST activities.

1 One commenter described the process by which a leak would be detected and controlled
2 during a WST, thereby minimizing the potential for fracturing WSTs causing a surface
3 expression. This commenter also described procedures that could be used to ensure the integrity
4 of the casing and cement. Another commenter recommended that a provision be included to
5 ensure tubing-casing annuli are actively monitored for leak detection during operations.
6

7 **Response:** These comments buttress the analyses and conclusions presented in the PEA.
8 The prevailing methods for monitoring pressure during WSTs would be effective in limiting
9 potential releases in the case of a leak. All opening annuli must be monitored and reported to
10 BSEE on a monthly basis. BSEE will require mitigation if pressure leakage or a pressure
11 communication between annuli. With respect to data on casing failures and the age of the
12 existing wells, as noted in the PEA there have been no known incidents of casing failures related
13 to WSTs on the POCS. The specific assessment of a wellbore failure accident (cement failure)
14 that was conducted for the PEA relates only to WSTs, and any such accidents from normal (non-
15 WST related) operations are not within the scope of the PEA or its supporting analysis. The
16 noted requirement of both a casing failure and a cement failure happening simultaneously is
17 consistent with the PEA conclusion that well failure release is highly unlikely to result from
18 WSTs. With respect to confirming that well casings and other well components have been
19 designed to withstand WST pressures, such information is currently required (see regulations at
20 30 CFR 250, subpart D), and would continue to be so, for all WST APMs submitted by operators
21 and would be reviewed and approved by BSEE specialists prior to any authorization of a
22 requested WST. Factors related to infrastructure use and age are discussed in Issue 10 below.
23
24

25 **Issue 6.2: Analysis of Accident Frequency or Severity**

26

27 Commenters stated that BOEM has not performed a comprehensive environmental risk
28 assessment for accidents based on established principles, and fails to take a hard look at the
29 impacts from a spill or other accident. A commenter recommended that the PEA indicate
30 whether WST activities would increase the likelihood or severity of accidents or spills above
31 baseline. Commenters asked that the PEA include the accident/spill frequency under baseline as
32 compared to under WST use, the extent of the WST effect on risk of certain types of accidents,
33 worst-case scenarios under baseline compared to under WST use, and the extent of WST effects
34 on risk by extending the lives of wells that would otherwise be abandoned. A commenter asked
35 that the PEA analyze a scenario in which future WST use is much higher, or provide quantitative
36 information on the risk of well casing failures during WSTs so accident potential can be
37 extrapolated.
38

39 **Response:** NEPA requires the action agency to evaluate the reasonably foreseeable
40 impacts of the proposed action and alternatives; a worst case scenario is not required. Therefore,
41 the Bureaus discussed in this PEA the potential impacts from accidents related to WSTs, which
42 may not be likely but could be reasonably foreseeable. Even those that are not reasonably
43 foreseeable, such as surface expression or induced seismicity, were evaluated in the PEA given
44 the concern over these issues with the public or in onshore use of WSTs. Because no WST-
45 related accidents have occurred over several decades of use on the POCS, the baseline accident
46 rates for WSTs cannot be determined with any accuracy, but would be less than 1 in roughly

1 50 (<2%), based on the number of WSTs that have been conducted without incident. With
2 respect to vessel accidents from WST operations, only vessel accidents related to POCS have
3 been recorded in BSEE records over the past 25 years; both involved fishing vessels that struck a
4 platform and were unrelated to any WST activity. Section 4.3.1 presents a similarly small
5 number of vessel incidents associated with platform supply vessels reported by the U.S. Coast
6 Guard for the entire Southern California area, and neither of these was associated with WST
7 activity. A handful of additional vessel trips per year for WST activities would contribute a
8 negligible increase to this very low baseline accident rate. Additional information regarding
9 baseline vessel accidents has been added to the PEA in Section 4.3.1.

12 **Issue 6.3: Analysis of Accidents Involving WST Chemicals**

14 A commenter stated that the PEA fails to disclose the fate and effects of WST chemicals
15 should a drill string break or become disconnected. A commenter stated that the PEA fails to
16 describe the effects on air quality, water quality, benthic communities, fish, marine and coastal
17 birds, marine mammals, sea turtles, or contamination of critical habitat for Endangered Species
18 Act (ESA) listed species or essential fish habitat from the release of WST fluids as a result of
19 inevitable accidents. Commenters stated that the PEA provides only vague descriptions of the
20 types of accidents expected and fails to identify the chemicals released. Commenters indicated
21 that the PEA improperly dismisses the impacts from accidental spills during transportation of
22 chemicals or waste, during drilling activities, or from earthquakes, claiming they are regulated
23 and unlikely, and ignoring substantial information on past occurrences.

25 **Response:** Analyses in the PEA considered three reasonably foreseeable accident
26 scenarios: accidents during transport of WST chemicals; accidents during injection of WST
27 chemicals; and accidents during handling of WST waste fluids. These accident types and their
28 anticipated likelihood of occurrence are presented in Section 4.3 of the PEA. Discussions of the
29 potential effects of releases of WST chemicals or hydrocarbons from accidents are presented in
30 each of the individual resource sections of Chapter 4 for various resources. The fate and effects
31 of an accidental release of hydrocarbons and WST chemicals from a WST-related accident are
32 covered broadly, commensurate with the programmatic nature of the PEA, under the accident
33 discussions within the air quality, water quality, and ecological resources sections of Chapter 4
34 (Sections 4.5.1.2, 4.5.1.3, and 4.5.1.4, respectively). The fate of hydrocarbons released under
35 such circumstances would be similar to that observed following historical accidental
36 hydrocarbon releases. WST chemicals that would potentially be released would be among those
37 in Tables 4-12, 4-13 and 4-14 of the PEA. The PEA analyzes potential accidents from all phases
38 of WST operations, including delivery and handling of WST materials, from equipment failure
39 during injection of WST fluids, and from releases within the well below the seafloor during
40 injection, even where certain such scenarios are not reasonably foreseeable. These accident
41 scenarios were described and analyzed at a level of detail sufficient to understand the potential
42 environmental consequences of the events.

Issue 6.4: Oil Spills

Commenters stated that offshore WST use increases the risk of oil spills, such as the 2015 Refugio spill, and could kill wildlife, close fisheries and beaches, oil miles of coastline, and cost hundreds of millions of dollars in lost economic benefits and jobs. A commenter indicated that the high injection pressures used to break up rocks below the sea and access oil carry huge risks of causing more spills. A commenter suggested that impacts from the Refugio spill should be considered in formulating a response scenario for protection of marine and coastal birds. A commenter stated that offshore pipelines face displacement and more corrosion than onshore pipelines, increasing the risk of an oil spill in older pipes. A commenter stated that the PEA fails to describe the effects on air quality, water quality, benthic communities, fish, marine and coastal birds, marine mammals, sea turtles, or contamination of critical habitat for ESA-listed species or essential fish habitat, due to the release of hydrocarbons as a result of inevitable accidents.

Response: Analyses conducted for the PEA indicate that implementation of WSTs at the expected level of future use (i.e., occasional and up to five per year; comparable but conservative given historical uses that have occurred [Section 4.1]) would result in negligible increases in the risk of spills, and concluded that oil spills from future infrequent use of WSTs on the POCS would be highly unlikely and are not foreseeable (Section 4.3.2). This analysis considered only the risks associated with using any of the four WSTs, and the assessment of oil spills during non-WST-related oil and gas production is outside the scope of this PEA. In the event of an accidental hydrocarbon release during a WST application, oil spill response would be conducted in accordance with the operator's required Oil Spill Response Plans approved by BSEE and coordinated with the U.S. Coast Guard. Such plans would be informed by the effects of and responses to historical oil spills in the region, including the 2015 Refugio spill. The minor quantities of WST fluids and small additional quantities of oil produced from WSTs that may be accidentally released would present only minor increases in risks from releases that might occur during non-WST O&G production on the POCS. Routine maintenance, inspection, and monitoring of pipelines are used to limit the risks of pipeline failures. Consequences of oil spills on potentially affected resources as a result of WST-related accidents are covered in the accident analysis portions of the respective resource sections in Chapter 4 of the PEA.

Issue 7: Adequacy of NPDES Protectiveness/Produced Water Disposal

A comment received supports the adequacy of the NPDES permit for O&G exploration, development, and production at offshore facilities; this comment states that it addresses discharges from offshore operations, that the findings and protections in the permit are based on many years of chemical and aquatic testing, and that the requirements attached to the permit are comprehensive. The commenter also mentioned new testing required by the permit and additional chemical inventory and reporting requirements that provide additional protection. Another letter received also supports the adequacy of the NPDES permit, and provided documentation to further support the statement that impacts from discharges even inside the 100-m mixing zone are very minor and insignificant.

1 In contrast to the above, other comment letters expressed concern that the NPDES permit
2 monitoring is not specific for or indicative of hydraulic fracturing components, and that the
3 timing of sampling is unlikely to coincide with or measure any potential impacts from WSTs. In
4 addition, if the whole-effluent toxicity tests indicate no observable effects, testing will be
5 decreased from quarterly to yearly, further minimizing the potential to actually measure
6 discharges containing well stimulation treatment components. These commenters state that the
7 impact conclusions presented in the permit (e.g., impacts on marine mammals) should not be
8 relied on for the evaluations in the PEA.

9
10 Commenters questioned whether the whole-effluent toxicity testing required by the
11 NPDES permit can adequately address long-term, chronic effects of pollutants on marine biota or
12 potential indirect effects of bioaccumulating contaminants at higher trophic levels. One
13 commenter does not believe that the presumed dilution rates provide adequate assurance that
14 toxicity will not occur. It is the opinion of one commenter that there should be a prohibition on
15 effluent discharges containing well stimulation treatment chemicals. Another commenter stated
16 that since the NPDES permit has no limits on the amount of WST chemicals that can be
17 discharged when combined with produced water the permit is inadequate to protect water
18 quality.

19
20 **Response:** The development and the requirements of the NPDES general permit are
21 discussed in Section 4.5.1.3 of the PEA. This section notes that monitoring of specific WST
22 additives is not required by the permit, and describes the use and limitations of the WET test in
23 monitoring the toxicity of WST ocean discharges. The related discussion in Section 4.5.1.3
24 discusses the several aspects of prevailing monitoring program that would detect adverse effect
25 from WST-related discharges, and presents an analysis of potential marine toxicity of WST
26 additives. This analysis is based on the known composition and quantity of WST additives used
27 in a typical full-scale operation, the expected concentration of the additives in the discharges and
28 at the NPDES Permit 100-m point of compliance, and the toxicity values for additives that have
29 such values available as noted in Tables 4-13 and 4-14 of the PEA.

30
31 This analysis and the PEA acknowledge the lack of toxicity values for many common
32 WST additives that have been historically used in onshore WSTs in California, but are still able
33 to conclude that toxicity to marine life would be minor. This conclusion is based largely on the
34 known low concentrations of the WST-related chemicals that would be present in discharge
35 waters and in particular at the 100-m NPDES point of compliance. The upper limits on these
36 concentrations are known with high confidence because they are based on known quantities
37 injected, known recovery levels, and known dilution levels prior to discharge. The chemicals and
38 levels analyzed in the PEA represent the full suite of chemicals used historically in onshore
39 California applications at the maximum levels used (see Tables 4-3 and 4-14). Typical offshore
40 WSTs use a subset of these chemicals at lower average concentrations.

41
42 The absence of toxicity data for some WST additives is noted in the PEA as a concern,
43 but this absence does not prevent a conclusion of no significant effects. Such data gaps add a
44 measure of uncertainty to the analysis, but this uncertainty is circumscribed by (1) the known
45 toxicity of many components; (2) the lack of effects of the most toxic compounds for which
46 toxicity values are available, including biocides (which are added specifically for their very

1 toxicity); (3) the low likelihood that chemicals without toxicity values would have toxicities that
2 are substantially higher than the most toxic compounds that have such values and are already
3 considered; and (4) the fact that studies have not detected significant effects from historical
4 discharges of vastly greater quantities of produced water over decades, discharges that similarly
5 contain low concentrations of complex mixtures of petroleum hydrocarbons. Moreover, it is a
6 practical impossibility to test the toxicity of every discharged chemical against every potentially
7 exposed marine species. The WET presents a reasonable compromise and would be effective in
8 detecting toxicity of a broad class of chemicals on a broad class of marine organisms and would
9 respond to the potential synergistic effects of combinations of chemicals.

10
11 The PEA does acknowledge potential sub-lethal and subtle short-term impacts on some
12 species within the 100-m mixing zone. Such effects would be expected to be minor and would
13 never rise to a level within this small mixing zone that could result in population-level effects
14 that would be considered significant under NEPA. There is no evidence to suggest that there
15 would be any discernable effects on ESA-listed species from WST additives at the levels
16 discharged. Exposures would be low-level, short-term, and largely avoidable, particularly by
17 marine mammals, and would not be expected to cause any discernable adverse effects on
18 individual organisms. Finally, the chemical additives used are highly water soluble and thus not
19 fat soluble (lipophilic), and do not have properties of persistent bioaccumulative compounds,
20 which are generally hydrophobic, highly stable, and typically chlorinated. Thus, chronic, residual
21 toxicity or biomagnification of WST additives, which are typically not persistent in the ocean
22 environment due to water solubility, biodegradation, and photodegradation in the marine
23 environment, is not generally of concern. Any lipophilic additives that might be used would
24 partition to the oil product phase during oil/water separation, and thus would not be expected to
25 be found in produced water generated during a WST. Additional discussion which further
26 supports a conclusion of the effectiveness of the NPDES permit in protecting marine life and
27 limited concern for toxicity of WST additives in discharges has been added to Section 4.5.1.3 of
28 the PEA.

31 **Issue 8: Climate Change**

32
33 Commenters expressed a variety of concerns regarding climate change and the release of
34 GHGs, with some comments more general and others specifically relating to WST use. General
35 comments included overall concerns about climate change, national and State efforts to reduce
36 GHG emissions, increasing use of green and renewable energy alternatives, rising CO₂
37 concentrations in the atmosphere, the need to reduce atmospheric carbon levels, sea level rise,
38 permafrost melting, warming global temperatures, the need to limit warming, and meeting
39 commitments to the 2015 Paris Agreement of the Conference of the Parties of the United Nations
40 Framework Convention on Climate Change. More specific PEA comments and concerns
41 associated with WST use included the potential for WST use to undercut national efforts to
42 address climate change; offshore WST use emits GHGs, especially methane, and thus contributes
43 to climate disruption; and the increase in WST-related vessel traffic, along with the
44 transportation and refining of WST-produced O&G, emits greenhouse pollutants exacerbating
45 climate change.

1 A commenter requested that the PEA estimate the incremental contribution of fugitive
2 methane emissions under each alternative. A commenter stated that the PEA fails to discuss
3 impacts from the contributions of GHG emissions associated with routine WST activities, either
4 per project or cumulatively.
5

6 **Response:** The potential effects on climate change from WST activity-related emissions
7 of CO₂ and methane are analyzed in Section 4.5.1.2 of the PEA, and the results of those analyses
8 indicate negligible effects on climate change. Increases in O&G production resulting from WSTs
9 would be modest at most, given the expected very low and infrequent use of WSTs on the POCS,
10 and likely would only displace such production from other sources to meet ongoing demand.
11 Methane emissions related to WSTs were estimated to be much less than the 9.3-metric-ton
12 estimate for CO₂ emissions for a typical full-scale WST and less than 10% of this value on a
13 CO₂ - GHG equivalent basis, based on ARB data for the oil and gas industry (Section 4.5.1.2).
14

15 While the Bureaus included a qualitative analysis of the potential GHG emissions related
16 to WST activities (including, among others, vessels used in the WST activity) in the draft PEA,
17 they also include a qualitative analysis of the downstream GHG emissions from consumption of
18 O&G produced as a result of WSTs (see Section 4.5.1.2). A quantification of GHG emissions
19 from downstream consumption is unnecessary for this PEA; the qualitative analysis provided in
20 the PEA reliably demonstrates that the potential impacts of GHG emissions directly or indirectly
21 related to WST activities could not be significant. As described in the PEA, in Section 4.5.1.2,
22 the potential increases in GHG emissions due to downstream consumption of OCS O&G
23 produced as a result of WSTs is small, even taken in isolation; however, given the likely
24 substitution of other crude supplies for this foregone OCS production and this suggests that any
25 potential impact is not significant when compared to State emissions.
26

27 As mandated by NEPA, the purpose of this PEA is to determine whether the agency can
28 prepare a FONSI, indicating that an environmental impact statement is not required
29 (40 CFR 1501.4). Through the analyses provided in this PEA, the Bureaus determined that GHG
30 emissions related to WSTs, whether through direct emissions or due to consumption, are not
31 likely to have significant impacts. The Bureaus have met their obligation under NEPA in the
32 analysis provided in this PEA, determining that WST use on the POCS would not have a
33 significant impact on GHG emissions.
34
35

36 **Issue 9: Reform BSEE Regulations (e.g., Require NEPA Analyses for More Routine** 37 **Activities)** 38

39 A commenter urged BSEE to work with the EPA to develop a whole effluent toxicity
40 testing protocol specifically designed to measure impacts on marine biota exposed to well
41 stimulation treatment effluents.
42

43 Several commenters want stronger regulations for offshore WSTs. One commenter
44 specifically wanted offshore fracking regulated to the same degree it is for land-based fracking,
45 and wants all wastewater and chemicals discharged into the ocean from platform wells to be
46 reported and issued to all media outlets. A commenter states that approving WSTs without

1 requiring development and production plan amendments would violate the Outer Continental
2 Shelf Lands Act (OCSLA) and its implementing regulations.

3
4 **Response:** WST use on the POCS is already highly regulated. Owners or operators
5 proposing to conduct WSTs on the POCS must first obtain an APD or APM from BSEE, which
6 subjects the request to stringent safety standards and reviews and has the discretion to require
7 additional conditions of approval on a case-by-case basis. In addition, the operator must obtain
8 and comply with an NPDES permit for all of their activities and discharges at the platform, not
9 just WST activities and related discharges. Those discharges are subject to stringent WET limits,
10 which are required to ensure that all NPDES permitted activities on the POCS do not result in an
11 unreasonable degradation of the marine environment. Nevertheless, BOEM and BSEE
12 continually evaluate offshore oil operations under their jurisdiction to ensure that the Nation's
13 offshore energy reserves are managed and developed in the most environmentally sound and
14 safest manner possible. While the development of new BOEM or BSEE regulations is outside
15 the scope of this PEA, both Bureaus will continue to monitor activities on the POCS to
16 determine whether future regulatory changes are prudent, consistent with their mandates under
17 OCSLA.

20 **Issue 10: Extension of Platform Life/Risks from Aging Infrastructure**

21
22 Commenters indicated that the PEA should clarify whether existing wells, having been in
23 production for up to 48 years, would be more susceptible to casing failure during WST
24 operations due to their age. A commenter felt that the PEA fails to identify how the Bureaus
25 would determine whether platforms and wells have been designed for the extended life
26 associated with continuing production for the intended period and whether additional
27 engineering studies must be completed. Commenters indicated their belief that, because of aging
28 infrastructure, longer lifetimes for old reservoirs and wells increase the risk of failures of
29 pipelines, well control, or other equipment; they also stated that WST use prolongs the life of
30 O&G drilling operations, causing environmental impacts associated with conventional O&G
31 development. A commenter stated that some platforms are already operating well beyond their
32 estimated lifespan, that WST would extend the life of these platforms further, and that the
33 Bureaus have not addressed the increased environmental impacts and risks.

34
35 **Response:** The Bureaus are aware of concerns regarding platform life and aging
36 infrastructure, and BSEE has a number of procedures in place to address aging platforms and
37 infrastructure. The BSEE Pacific Region has an inspection program wherein BSEE inspectors
38 conduct announced annual inspections, and unannounced inspections throughout the year, for all
39 production facilities. In addition, all operators are required (30 CFR 250.919) to submit annual
40 topside and jacket inspection reports per American Petroleum Institute (API) Recommended
41 Practice 2A-WSD for Planning, Designing, and Constructing Fixed Offshore
42 Platforms—Working Stress Design (30 CFR 250.198). This industry-recommended practice
43 includes guidelines used in conjunction with API Recommended Procedure 2SIM for Structural
44 Integrity Management for assessing existing platforms to determine the structure's fitness-for-
45 purpose. BSEE also has procedures in place for addressing and preventing wellbore casing
46 failure (30 CFR 250.519-531, Subpart E).

Issue 11: General Opposition to or Support of Offshore Fracking/WST Use

Two large groups of commenters (most of whom were associated with campaign responses), as well as a number of individual and organizational commenters expressed either opposition to, or support for, offshore fracking WST use.

Issue 11.1: Opposed to Offshore Fracking/WST Use

Commenters (including a campaign submitting the same or a slightly modified letter from 5,362 individuals) on this issue expressed their viewpoint against offshore hydraulic fracturing ('fracking')/WSTs and for the continuation of the moratorium on offshore fracking/WSTs. Reasons for this viewpoint included concerns that increased hydrocarbon production resulting from fracking would increase the potential for accidents that would impact the environment; harming natural resources; and causing a loss of tourism revenues, commercial and sport fishing, offshore aquaculture, human health and welfare (lives), or property. In addition, these commenters felt that fracking could result in the discharge of wastewaters and toxic chemicals into the ocean, impact the coast, affect the Chumash Native American cultural marine resources, and impact drinking water sources. Several commenters also expressed their concerns that fracking is occurring without adequate oversight. It was stated several times that the moratorium on offshore well stimulation should continue until independent scientific studies clearly determine that this practice does not cause adverse environmental impacts. Other commenters also believed that use of fracking increases the risk of earthquakes, that it increases the threat of oil spills, or that could contribute to climate change (Issue Category 5.0 addresses seismicity, Issue Category 6.2 addresses oil spills, and Issue Category 8.0 addresses the climate change).

Response: The Bureaus note these comments and take them under advisement, but this PEA is not a decision document and there are no currently pending requests to conduct WSTs on the POCS. Specific proposals for WST use received by BSEE will be evaluated on a case-by-case basis to determine whether and/or how to approve the request.

Issue 11.2: Support of Offshore Fracking/WST Use

Commenters (including a campaign submitting the same or a slightly modified letter from 5,282 individuals) expressed their support for the continuation of offshore hydraulic fracturing. Reasons for this support included benefits to our Nation's economy and energy security. Mention was made that the small concentration of well stimulation chemicals used, including during acidization, would not pose an incremental risk to marine biota. A concern was also expressed that foreign oil is produced with little or no environmental protection; therefore use of hydraulic fracturing would lower our Nation's dependency on foreign oil.

Response: The Bureaus note these comments and take them under advisement, but this PEA is not a decision document and there are no currently pending requests to conduct WSTs or hydraulic/acid fracturing on the POCS. Specific proposals for WST use received by BSEE will be evaluated on a case-by-case basis to determine whether and/or how to approve the request.

Issue 12: Cessation of Offshore Oil and Gas Development and Production and a Switch to Renewable Energy

A number of comments received indicated a desire for the reduction or ending of O&G production or an increase in the use of renewable energy sources, or both. Commenters expressed opposition to the continued use of fossil fuels and especially O&G from offshore California, and called for switching over to renewable energy, including converting platforms to host solar and wind energy production.

Opposition to continued O&G development along the California coast was based not only on environmental concerns associated with oil spills and climate change, but also on a perceived lack of oversight by the agencies responsible for protecting the public and natural resources. Commenters called for California to “move swiftly to renewable energy, it is good for the economy, and creates more green jobs than lost fossil fuel jobs,” and stated that moving to renewable energy will “help California meet and surpass our commitment to the Paris Agreement of COP21.”

Response: Several commenters noted preferences for or recommendations on programs managed by the Bureaus, including but not limited to prohibiting offshore oil and gas development, not allowing future drilling on the OCS and providing for more renewable energy. Given that this is a programmatic NEPA analysis for potential future requests for application of WSTs on the OCS off the coast of California, these comments are outside scope of this PEA. While the Bureaus acknowledge the commenters preferences on other aspects of their OCSLA mandates, the comments are not relevant to the preparation of this final PEA. However, the Bureaus note these comments and take them under advisement.

Issue 13: Monitoring and Environmental Enforcement

One commenter stated that BSEE/BOEM lacks follow-through in the monitoring of O&G companies’ safety management systems, that it has ongoing difficulties hiring and training safety inspectors, and that it has an unexplained failure to staff its environmental enforcement division. This commenter feels that these issues must be fully resolved before offshore WSTs are resumed. A commenter stated that data collection and recordkeeping concerning WSTs in Federal waters should at least match the requirements of SB-4, Oil and Gas: Well Stimulation. This commenter felt that reporting of offshore WST and water disposal data in Federal waters should be similar to State reporting requirements in order to establish baseline information about the possible impacts of chemical use offshore.

One commenter wants to know how WSTs will comply with the proposed Federal New Source Performance Standards for O&G production that are currently under development by the EPA. Another commenter recommended that all standard emission controls and permitting requirements be met. A commenter stated that it was unclear whether WST use would involve increased levels of testing and monitoring. This commenter believed that monitoring and testing should coincide with actual WST use so that the effects of the “worst case” levels of use would be tested at an appropriate time in the waste stream to improve the level of understanding of

1 effects. The commenter felt that such testing should be a required component of any permitted
2 WST activity until sufficient data exists to inform a broader analysis about the overall impacts on
3 marine resources from WST activities across the OCS.
4

5 A commenter stated that the lack of coordination between existing monitoring and WST
6 activities fails to adequately monitor impacts from WST fluids, and therefore the testing is
7 inadequate to verify that WST fluids are not contributing to chronic toxicity. The commenter felt
8 that additional monitoring via the Reasonable Potential Determination analysis that the NPDES
9 permit includes is needed before WST fluids can be determined to be safe.
10

11 Finally, a commenter recommended incorporating additional data from the discharge
12 monitoring reports (DMRs) and relevant chemical inventories to further inform the evaluation of
13 the potential impacts from WST discharges, as applicable.
14

15 **Response:** The Bureaus agree that appropriate data collection and record keeping should
16 and do govern O&G activities on the POCS and many of the Bureau requirements mirror those
17 of SB-4. However, due to the differences in POCS WST operations and the application of many
18 other Federal statutes as a result of the difference in jurisdictional boundaries, the requirements
19 are not exactly the same. Specifically, the WST chemical composition and toxicity as well as the
20 reporting requirements for produced water are governed by the NPDES permitting program
21 administered by the EPA under the Clean Water Act.
22

23 The Bureaus have obtained DMR data from EPA Region IX , and this information has
24 been incorporated into the water quality analyses presented in Section 4.5.1.3 of the PEA. The
25 Bureaus will use that as well as other information to evaluate the timing, frequency, and levels of
26 testing and monitoring to be required as potential conditions of approval of permits for WST.
27 Once monitoring requirements are imposed, the information that it provides will be used to
28 determine whether additional mitigation, monitoring, or further environmental review should be
29 required as a part of the adaptive management process. Also see responses to Issues 14,
30 Mitigation, and 17, Need for Adaptive Management.
31

32 Other comments as described above are outside of the scope of this PEA. For example,
33 the Bureaus take under advisement the comments on their monitoring programs, staffing, and
34 policy initiatives. However, they are unrelated to this PEA and potential WST use on the POCS.
35 In addition, the New Source Performance Standards are not yet finalized and therefore it would
36 be premature to fully describe their potential effect on operations on the OCS, including potential
37 WST use. However, the new standards, should they be finalized and applied to existing OCS oil
38 and gas activities, would be expected to further limit air emissions, thereby reducing further the
39 already small air emissions described in this PEA. They would certainly not be expected to result
40 in increased emissions from WST activities. Therefore, while the new standards are not finalized
41 and not able to be fully evaluated in this PEA, the analysis herein remains conservative and if
42 anything potentially overestimates the small emissions increases expected.
43
44

1 **Issue 14: Mitigation**

2
3 Several comment letters stated that the Draft PEA provides an inadequate range of
4 mitigation measures from WST use and discharges (including accidental releases) to prevent
5 water quality and air quality degradation; protect marine biota, marine and coastal birds
6 (including special status species, recreational and commercial species, and essential fish habitat),
7 areas of special concern, recreation and tourism, archaeological resources, and geological
8 resources in seismically active areas; and minimize economic and social impacts (including
9 environmental justice concerns). They also state that the Draft PEA does not provide cleanup or
10 mitigation strategies in the event of WST-related accidents.

11
12 One commenter suggested a number of potential mitigation measures such as disclosing
13 WST fluid constituents and additives on a publicly available website; notifying stakeholders
14 prior to WST use or discharge; requiring operators to specifically include information on
15 handling WST fluids and additives in their Oil Spill Response Plans and toxicity testing
16 permitted discharge waters following each WST to address perceived gaps regarding WST fluid
17 toxicity. The commenter also requested that the PEA incorporate a discussion of how the Federal
18 action would comply with the Department of the Interior's Landscape Scale Mitigation Policy
19 released in 2015.

20
21 Other commenters requested that the Final PEA identify specific minimization and
22 mitigation measures, as necessary, to support a FONSI. A commenter also wanted the discussion
23 on air quality/climate change to include practical methods to reduce emissions, including fugitive
24 methane emissions.

25
26 **Response:** As a part of the NEPA process, mitigations may be developed to avoid,
27 minimize, rectify, reduce or eliminate, and/or compensate for any impacts of an action. This is
28 distinctly different from monitoring and environmental enforcement. Environmental monitoring
29 can be defined as the systematic sampling or evaluation of air, water, soil, biota, or other criteria
30 in order to observe and study the environment, as well as to derive knowledge from this process.
31 Environmental compliance and enforcement monitoring is a continuous process of obtaining
32 information to determine whether the applicable parties and activities are following prescribed
33 procedures from conditions, standards, regulation, statutes, and other requirements that are
34 intended to mitigate environmental impacts and may be required under a number of different
35 authorities or laws (e.g., OCSLA, Clean Water Act, Clean Air Act).

36
37 BOEM and BSEE collaborate on the development of mitigation for a proposed action as
38 part of the NEPA process or as lease stipulation or condition of approval associated with a plan
39 or permit. The OCSLA staged decision-making process (providing for the imposition of
40 requirements at the lease sale, exploration plan, development plan, and permit stages) is uniquely
41 suited to allow for an adaptive process for identifying mitigations at each stage. Once they have
42 been established, BSEE is responsible for verifying compliance with mitigation and/or
43 monitoring requirements as well as evaluate their effectiveness. BSEE then provides compliance
44 and effectiveness feedback to BOEM to decide whether and what modifications should be made
45 as a part of the adaptive management process.

46

1 This PEA addresses more general environmental impacts associated with WST use and
2 identifies mitigations appropriate for consideration at a programmatic level. However, as noted
3 above, the OCSLA staged decision-making process allows for consideration and imposition of
4 additional mitigation or requirements when a site-specific proposal is submitted for review and
5 approval. Once a permit application is received involving WSTs, additional site-specific
6 environmental analysis will be conducted to determine whether additional mitigation and/or
7 monitoring is appropriate specific to the operation, location, and any other applicable factors
8 associated with the permit application.
9

10 **Issue 15: Consultation and Other Reviews**

11 **Issue 15.1: Government-to-Government Consultation/Notification**

12
13
14
15
16 A comment letter from a nongovernmental organization (not a tribal representative)
17 stated that the Federal government must consult with all Chumash peoples and the Federally
18 recognized Chumash tribe due to the number of underwater Chumash cultural and historic
19 resources and traditional fishing grounds in the Santa Barbara Channel that could be affected by
20 the proposed action; and that the Federal government must maintain the general trust doctrine
21 between the United States and Indian tribes. A commenter expressed concern that in the past,
22 appropriate State and local agencies were not notified in a timely fashion about WSTs as
23 required by statute. In addition, the commenter felt government-to-government consultations
24 with affected Tribal entities must be initiated relative to any potential impacts to archaeological
25 resources and for other purposes. A commenter noted that there are notification requirements for
26 portable engines registered in the Statewide Portable Equipment Registration program to be
27 operated offshore. A Santa Barbara County Air Pollution Control District form calls for
28 notification if the project will include hydraulic fracturing.
29

30 **Response:** The issue of formal government-to-government consultation, a policy matter
31 of the government regarding Federally recognized Indian tribes, arises from Executive Order
32 13175. The Bureaus consider a number of factors in determining when to initiate consultation;
33 important in the current instance is the fact that the PEA does not directly authorize any
34 particular activity but rather provides environmental analysis that will help support decision
35 making on potential, but currently merely speculative, well stimulation activities. When specific
36 well stimulation projects are proposed in the future, the action agency will at that time evaluate
37 the need to initiate consultation.
38

39 Consultation and coordination with other entities are discussed by topic area in responses
40 below.
41
42
43

Issue 15.2: Consistency Review

A commenter stated that a Federal consistency review under the Coastal Zone Management Act will be required. Amended and supplemented OCS plans will require a consistency review, and this should be done at the programmatic stage rather than waiting for new individual proposals. A commenter stated that the use of WSTs should trigger a Federal consistency review.

Response: If a Federal agency's activities or development projects within or outside of the coastal zone will have reasonably foreseeable coastal effects in the coastal zone, then the activity is subject to a Federal Consistency Determination (CD) under the Coastal Zone Management Act (CZMA). With regard to OCS activities, a consistency review will be performed and CDs will be prepared for each CZMA State prior to a proposed lease sale. At the plan or permit approval stage, the U.S. Department of Commerce has developed specific regulations applicable to the OCS O&G program (15 CFR part 930, subpart E). Persons seeking plan or plan amendment approval must submit a consistency certification and supporting documentation indicating that the plan complies with the State's Federally approved Coastal Management Program (CMP) and will be conducted in a manner consistent with that program. Once an OCS plan consistency certification receives concurrence or is presumed to have concurrence under certain circumstances, the operator is not required submit additional consistency certifications or supporting information for State agency review at the time Federal applications are actually filed for the Federal licenses or permits under the plan to which such concurrence applies (15 CFR 930.79).

BOEM and BSEE continue to comply with CZMA and, even where consistency review or CDs are not formally required, continue to meet and discuss CZMA consistency issues with their State counterparts at the California Coastal Commission. Any operator submitting a proposal for use of WSTs will be expected to comply with the provisions of OCSLA and the CZMA, and submit plan revisions (if such are required) and consistency certifications as required by law.

Issue 15.3: Stakeholder Involvement

A commenter could not find documented procedures used for stakeholder participation during the Draft PEA preparation. A commenter stated that public scrutiny and improved interagency coordination need to be improved and incorporated into the review process. The commenter mentioned that it is unclear as to whether BSEE/BOEM would implement increased levels of interagency coordination prior to approving APDs or APMs for WST use. A commenter stated that a consistency review (see Issue Category 15.1) would alleviate the public's concerns over lack of transparency and enable the public to continue to receive additional information and analysis as it becomes available, and before regulatory decisions are finalized. Other commenters urge BSEE/BOEM to give full and fair consideration to the comments received from concerned stakeholders.

1 **Response:** As noted earlier in the responses to Issue Category 1 above, stakeholder
2 involvement with this PEA went beyond any statutory or regulatory requirements for EAs, as it
3 was released for public review and opportunities for comment and notice were provided in the
4 *Federal Register*. The Bureaus gave full consideration to the comments received as a result of
5 the public review period, and have provided responses in this appendix, as well as revising the
6 text of the PEA in some instances.

9 **Issue 15.4: Endangered Species Act Consultation**

10
11 A comment letter expressed concern that BSEE/BOEM does not intend to initiate
12 Endangered Species Act (ESA) consultation with the U.S. Fish and Wildlife Service or National
13 Marine Fisheries Service on the PEA. The commenter further states that failure to do so would
14 be a violation of the act, as any “no effect” determination is not supported by the available
15 evidence and best scientific information available.

16
17 **Response:** This PEA has been prepared to elucidate potential environmental impacts
18 from a suite of WSTs, as a decision support tool for future proposals. The PEA does not
19 constitute an authorization or approval of any immediate WST activity. Any future proposals that
20 require Federal approval will undergo contemporaneous environmental review (including
21 assessment of any potential impacts on ESA-listed species and critical habitat) and, if deemed
22 appropriate, analysis and consultation.

25 **Issue 16: Editorial Comments**

28 **Issue 16.1: Technical Comments/Clarification of Text**

29
30 A commenter wants the PEA to clearly differentiate between acid WSTs (which are
31 seldom proposed) and acid treatments (which are completion or maintenance techniques used on
32 most wells). According to the commenter, only the acid WSTs should be assessed, as
33 appropriate, in the impact evaluation for the alternatives. The commenter listed a number of
34 specific technical comments and suggested clarifications on the information presented in the
35 Draft PEA. These include, but are not limited to, clarifying what activities fit within respective
36 WST fracturing and non-fracturing definitions; needing to include key information about the fate
37 of WST fluids in the summary; correcting inconsistencies between what is presented in the
38 summary and the main text; suggesting text to provide background information on fracking
39 procedures; avoiding potentially misleading use of “larger and small” when discussing fluid
40 volumes; clarifying that there are many possible fracturing fluids (not just seawater); and
41 suggesting items to include in the conclusion that are used elsewhere in the document.
42 Information was also provided on why it would be unnecessary to eliminate WSTs in shallow
43 formations (<2000 ft. from the mudline).

1 A commenter desired more information about the criteria used to classify risks as very
2 low and low. One letter commented that Table 3-3 on air quality standards needed to be updated
3 to reflect the revised Federal 8-hr ozone standard. A commenter requested that the PEA include
4 reference to the report by C.M. Hudgins, Jr., *Chemical Treatments and Usage in Offshore Oil*
5 *and Gas Production Systems*, which evaluated many of the chemicals (or chemical families)
6 listed in the PEA.

7
8 **Response:** Text has been added to clarify and update the PEA where needed and to
9 correct inconsistencies. The impact evaluation presented in the PEA addresses specific acid-
10 based WSTs. For the PEA, matrix acidizing is considered a WST (this is consistent with the
11 SB-4 definition for WST), and is distinguished from activities such as acid wash that are
12 considered to be part of routine operations (see Section 2.2.4.1, Acid Wash). The PEA
13 determination of accidents having a low or very low probability of occurring are based on the
14 experience of several decades of WST use on the POCS, with no WST-related accidents at any
15 of the platforms, and only two PSV accidents associated with OCS platforms reported during
16 that time (also see the response to Issue 6.2). Regarding comments that recommended including
17 additional scientific resources in the references, the Bureaus reviewed the additional resources
18 and added them as appropriate.

21 Issue 16.2: Typographical and Grammatical Comments

23 A commenter identified several typographical errors that need correcting.

25 **Response:** The errors have been corrected.

28 Issue 17: Need for Adaptive Management

30 A commenter suggested that the uncertainty in the future use of WSTs be addressed
31 through an adaptive management strategy so that if the rate of WST use increases above
32 historical levels, the practice would undergo additional environmental review.

34 **Response:** Adaptive management is a structured, iterative process of robust decision
35 making in the face of uncertainty, with an aim to reducing uncertainty over time via system
36 monitoring. It is the integration of research, design, management, and monitoring to
37 systematically test assumptions to adapt and learn.

39 As discussed in the response to Issue 14, BOEM and BSEE collaborate in the
40 development of mitigation for a proposed action as part of the NEPA process or as a lease
41 stipulation or condition of approval associated with a plan or permit. The OCSLA staged
42 decision-making process (providing for the imposition of requirements at the lease sale,
43 exploration plan, development plan, and permit stages) is uniquely suited to allow for an
44 adaptive process for identifying mitigations at each stage. Once mitigation and/or monitoring
45 requirements are established, BSEE is responsible for verifying compliance with those
46 requirements as well as evaluating their effectiveness. BSEE then provides compliance and

1 effectiveness feedback to BOEM to decide whether and what modifications should be made as a
2 part of the adaptive management process. Such an adaptive management process is included in
3 the Bureaus' review process for and oversight of future WST use proposed on the POCS.
4
5

6 **Issue 18: Incomplete or Unavailable Information**

7

8 Several commenters expressed concern that many of the components used in WSTs are
9 not made known to the public, and that the routine discharge of these chemicals into the water
10 column is inappropriate. They feel this raises environmental concerns, as a number of the known
11 chemicals used are toxic to aquatic biota and humans, and that quantifying the risk from WST
12 discharges is not possible without this information. They stated that the PEA needs to
13 acknowledge the data gaps, missing information, and consequent uncertainty regarding
14 environmental impacts. Concerns were also raised about heavy metals, organics, and radioactive
15 material that may be in flowback fluids that were not analyzed in the Draft PEA.
16

17 Comments also stated that whole effluent toxicity test information is not available for
18 WST fluids (e.g., toxicity information is available for some of the individual constituents but this
19 does not address the cumulative or synergistic impacts from the combination of all of the
20 constituents). Another comment mentions that the Draft PEA offers no peer-reviewed
21 documentation of the safety of any of the compounds utilized in acid fracturing at the
22 concentration cited in the document. A comment letter expressed concern over the data gaps in
23 the reporting of WSTs, composition of WST fluids, and toxicity data for the common chemicals
24 in fracking and acidizing fluids.
25

26 A comment letter stated that the impacts of WST waste fluid discharges should be fully
27 described, whether they are permitted or not. The letter commented that NEPA regulations
28 require Federal agencies to obtain such information if the costs of doing so are not exorbitant
29 (see 40 CFR 1502.22). Other comment letters expressed similar concerns about data gaps related
30 to the impacts of WST discharges. Commenters indicated that the PEA fails to take a hard look
31 at impacts by relying on data gaps and existing regulations and that a realistic assessment of
32 impacts is impossible without more data and analysis. A comment letter suggested that
33 information from DMRs submitted to EPA Region 9 be incorporated into the Final PEA to
34 provide a more informed evaluation of the potential impacts from WST discharges.
35

36 **Response:** In their comment letter of March 23, 2016, the NGO Environmental Defense
37 Center (EDC) raised a concern that the PEA did not comply with 40 CFR 1502.22, the CEQ
38 regulation governing the preparation of EISs with regard to incomplete or unavailable
39 information. Other commenters cited more generalized concerns over what they considered to be
40 incomplete information regarding WST activities and potential impacts. The CEQ regulation
41 cited by EDC acknowledges that government agencies rarely have complete information prior to
42 making decisions; 40 CFR 1502.22 provides the template by which agencies in their EISs can
43 acknowledge the lack of information and evaluate its relevance, whether it is essential to a
44 reasoned choice among alternatives, whether it can be obtained or obtained without exorbitant
45 cost, and the credible scientific information that can be used in its place if it cannot be obtained
46 because of cost, because the means to obtain it are not known, or because the information cannot

1 be obtained in a reasonably timely manner. While this is a PEA and not an EIS, the Bureaus have
2 attempted to address EDC and other commenter concerns in the final document by identifying
3 information that is incomplete or unavailable and providing a discussion of why the Bureaus can
4 move forward with their analysis in light of the incomplete or unavailable information. That
5 discussion is commensurate with the scope and purpose of an EA, which is not intended to be as
6 voluminous and detailed as an EIS.

7
8 In addition, several commenters on the draft PEA argued that the Bureaus failed to
9 include existing information and studies available on WSTs and potential impacts. The Bureau
10 subject matter experts reviewed the bibliographic information provided in the submitted
11 comments and used their scientific judgement to determine the relevance of those studies and
12 information to this analysis. Those that were relevant, useful to the analysis and discussion of
13 impacts, and publicly available were included in the preparation of this PEA. In weighing
14 competing or multiple studies on the same subject, Bureau staff used their expertise and
15 judgment to determine which should be included in the Final PEA. Other commenters on the
16 draft document argued generally that the PEA ignored relevant information in the public record,
17 but did not include any specific citations or references to the information they felt had been
18 omitted. Bureau staff, nevertheless, conducted an exhaustive literature search for information
19 relevant to this NEPA analysis for the Draft PEA, and updated that search for the preparation of
20 this Final PEA. This Final PEA includes all relevant available scientific data to the proposed
21 action and alternatives, and the impacts analyses provided.

22 23 24 **A.6 COMMENTER-ISSUE INDEX**

25
26 Table A-2 lists the names of all individuals and organizations which submitted comments
27 on the Draft PEA, and identifies the issue categories that were associated with each comment
28 submittal.

TABLE A-2 Commenter-Issue Index

Last Name	First Name	Organization	Issue Categories
Ackerly	David		2.2; 11.1; 18.0
aclemo			11.1
Allen	Benjamin	California State Senate, 26th District	2.1.1; 2.1.2; 2.1.3; 2.2; 2.3; 4.0; 6.4; 11.1; 18.0
Allen	Susan		11.1
Andersson	Andreas		2.2; 11.1; 18.0
Anguiano	Lupe	League of United Latin American Citizens	1.1; 1.2; 4.0
Anguiano	Lupe		5.0
Anguiano	Lupe		5.0
Ashki	Ayshegul	Orange County Interfaith Coalition for the Environment (OCICE)	1.1; 1.2; 4.0
Baker Botts, LLP		Halliburton Energy Services, Inc. (on behalf of)	2.1.6; 3.2; 6.0; 6.1; 16.1
Bea	Robert		2.2; 11.1; 18.0
Bea	Robert	Center for Catastrophic Risk Management, University of California, Berkeley	6.2
Beckett	Jeneen		2.1.1; 4.0; 4.1.1; 4.2; 5.0; 11.1; 18.0
Benson	Elly	Sierra Club	1.1; 1.2; 4.0
Block	Marty	California State Senate, 39th District	2.1.1; 2.1.2; 2.1.3; 2.2; 2.3; 4.0; 6.4; 11.1; 18.0
Blum	Vicky		2.1.3
Brashear	Amanda	California Department of Conservation, Division of Oil, Gas, and Geothermal Resources	1.1; 2.3; 3.2; 4.1.2; 13.0; 14.0; 15.3; 17.0; 18.0
Brennan	Pam		11.1; 12.0
Brockman	JE		11.1
Brooks	John	Citizens For Responsible Oil and Gas	1.1; 1.2; 4.0
Brown	Tara		5.0; 11.1
Caldeira	Ken		2.2; 11.1; 18.0
Capps	Lois	California 24th Congressional District–U.S. House	2.1.2; 2.2; 4.0; 8.0; 12.0; 15.3; 18.0
Chapin III	F. Stuart		2.2; 11.1; 18.0
Charter	Richard	The Ocean Foundation	2.1.2; 2.1.3; 2.1.5; 3.1; 3.2; 4.1; 4.1.2; 4.1.3; 4.2; 5.0; 6.0; 6.3; 8.0; 10.0; 13.0; 14.0; 15.1; 18.0
Child	Anna		5.0; 11.1
Cohen	Andrew		2.2; 11.1; 18.0
Cornelisse	Tara		2.2; 11.1; 18.0
Craven	Norma		3.1; 4.0
Daily	Gretchen		2.2; 11.1; 18.0

TABLE A-2 (Cont.)

Last Name	First Name	Organization	Issue Categories
De Los Santos	Theresa		11.1; 12.0
DeBenedittis	Suzanne	Frack Free Culver City	1.1; 1.2; 4.0
Dettmer	Alison	California Coastal Commission	2.1.1; 2.1.2; 2.1.4; 3.1; 3.2; 3.3; 4.1.1; 5.0; 6.1; 6.2; 7.0; 9.0; 13.0; 15.2; 15.3
Dillard	Joyce	Center for Biological Diversity	4.1.2; 5.0; 6.0
Eagle	Robert		2.2; 11.1; 18.0
Earle	Sylvia		2.2; 11.1; 18.0
Eidt	Jack	Tar Sands Action Southern California	1.1; 1.2; 4.0
Estes	James		2.2; 11.1; 18.0
Farr	Sam	California 20th Congressional District–U.S. House	2.1.2; 2.2; 4.0; 8.0; 12.0; 15.3; 18.0
Feldmann	Grace	Santa Barbara Frack Back to Save the Central Coast	1.1; 1.2; 4.0
Ferra	Daniel		8.0
Ferrazzi	Paul	Citizens Coalition for a Safe Community	1.1; 1.2; 4.0
Fitzpatrick	Tyler		11.1
Flanders	Jason R.	Aqua Terra Aeris Law Group	1.1; 1.2; 4.0
Freeman	Richard		11.1
Galliani	Joe	South Bay Los Angeles 350 Climate Action Group	1.1; 1.2; 4.0
Ganahl	Robin		3.1; 4.0; 4.1.3; 8.0; 12.0; 16.1
Garcia	Felipe (Dave)	Frack Free Butte County	1.1; 1.2; 4.0
Gautier	Catherine		2.2; 11.1; 18.0
Goforth	Kathleen Martyn	U.S. EPA Region 9	2.1; 2.3; 3.3; 4.1.2; 4.1.3 6.1; 8.0; 10.0; 14.0; 18.0
Gonzales	Elliot	Stop Fracking Long Beach	1.1; 1.2; 4.0
Gray	Richard	350 Bay Area	1.1; 1.2; 4.0
Haberly	Brian	350 Silicon Valley	1.1; 1.2; 4.0
Hall	Maggie	Environmental Defense Center	2.1.1; 2.1.2; 2.1.4; 2.2; 2.2; 2.3; 2.4; 3.1; 4.1; 4.1.1; 4.1.2; 4.2; 7.0; 10.0; 15.4; 15.5; 18.0
Hall	Maggie	Environmental Defense Center	1.1; 1.2
Harmon	Heidi	SLO 350	1.1; 1.2; 4.0
Henry	Bill		2.2; 11.1; 18.0
Henry	Devin		11.1
Hill	Jerry	California State Senate, 13th District	2.1.1; 2.1.2; 2.1.3; 2.2; 2.3; 4.0; 6.4; 11.1; 18.0
Holl	Karen		2.2; 11.1; 18.0
Holmes	Jean	League of Women Voters of Santa Barbara	2.1.4
Howarth	Robert		2.2; 11.1; 18.0

TABLE A-2 (Cont.)

Last Name	First Name	Organization	Issue Categories
Hubbard	Catalina		4.0; 11.1
Huffman	Jared	California 2nd Congressional District–U.S. House	2.1.2; 2.2; 4.0; 8.0; 12.0; 15.3; 18.0
Irwin	Jacqui	California State Assembly, 44th District	2.1.1; 2.1.2; 2.1.3; 2.2; 2.3; 4.0; 6.4; 11.1; 18.0
Jackson	Hannah-Beth	California State Senate, 19th District	2.1.1; 2.1.2; 2.1.3; 2.2; 2.3; 4.0; 6.4; 11.1; 18.0
Jesch	Beth		11.1
Kent	Sara	Coastal Environmental Rights Foundation	1.1; 1.2; 4.0
Koretz	Paul	Los Angeles City Councilmember	4.0; 5.0; 11.1
Krill	Jennifer	Earthworks	1.1; 1.2; 4.0
Kroeker	Kristy		2.2; 11.1; 18.0
Kurtz	Eddie	Courage Campaign	1.1; 1.2; 4.0
Lamm	Lamm	Ballona Creek Renaissance	1.1; 1.2; 4.0
Larson	Denny	Community Science Center	1.1; 1.2; 4.0
Lockhart	Sabrina	California Independent Petroleum Association	2.1; 3.2; 7.0; 11.2
Luthi	Randall	National Ocean Industries Association	2.3; 2.5; 3.2; 3.3; 4.1; 4.1.1; 4.2; 6.1; 7.0; 16.1; 16.2
MacKenzie	Michelle		11.1
Manfredi	Lisa		3.2; 4.0; 11.1; 12.0
Manfredi	Marilynne	Mercedians Against Fracking	1.1; 1.2; 4.0, 11.1
Mann	Michael		2.2; 11.1; 18.0
Marcuse	Harold		12.0
Martin	Ronals	Fresnans Against Fracking	1.1; 1.2; 4.0
Marx	Kenneth		11.2
Marx	Kenneth		11.2
McCandless	Susannah R.		2.2; 11.1; 18.0
McGuire	Mike	California State Senate, 2nd District	2.1.1; 2.1.2; 2.1.3; 2.2; 2.3; 4.0; 6.4; 11.1; 18.0
Monning	William	California State Senate, 17th District	2.1.1; 2.1.2; 2.1.3; 2.2; 2.3; 4.0; 6.4; 11.1; 18.0
Monsell	Kristen	Center for Biological Diversity	2.1.1; 2.1.2; 2.1.3; 2.1.4; 2.2; 2.3; 3.1; 3.2; 4.0; 4.1; 4.1.2; 4.2; 5.0; 6.0; 6.2; 6.3; 6.4; 7.0; 8.0; 9.0; 10.0; 11.1; 14.0; 18.0
Monsell	Kristen	Center for Biological Diversity	1.1; 1.2; 4.0
Morrison	Terry		11.1
Mulvaney	Dustin		2.2; 11.1; 18.0
Myhre	Sarah		2.2; 11.1; 18.0
Nadolski	David		11.1
Nagami	Damon	Natural Resources Defense Council	1.1; 1.2; 4.0

TABLE A-2 (Cont.)

Last Name	First Name	Organization	Issue Categories
Nakatani	Keith	Clean Water Action	1.1; 1.2; 4.0
Name withheld			11.2
Name withheld			2.1.1; 3.1; 4.0; 5.0; 9.0; 11.1
Name withheld			4.0; 5.0; 18.0
Name withheld			11.1; 12.0
Name withheld			3.2
Name withheld			11.1
Name withheld			5.0; 6.4; 11.1; 18.0
Name withheld			11.1
Name withheld			11.1
Name withheld			11.1
O'Dea	Katherine	Save Our Shores	11.1
Olsen	Donna	Tri-City Ecology Center	1.1; 1.2; 4.0
Orlinsky	Kathy		4.0; 8.0; 11.1; 12.0
Orlinsky	Stuart		3.2; 6.0
Painter	Michael J.	Californians for Western Wilderness	1.1; 1.2; 4.0
Pearson	Molly	Santa Barbara County Air Pollution Control District	3.3; 4.1.3; 13.0; 15.1; 16.1
Petrich	Paul		9.0
Pitterle	Ben	Santa Barbara Channelkeeper	2.1.2; 2.2; 7.0; 11.1; 13.0; 18.0
Preston	Craig		8.0; 11.1
Radford	Andy	American Petroleum Institute	2.3; 2.5; 3.2; 3.3; 4.1; 4.1.1; 4.2; 6.1; 7.0; 16.1; 16.2
Renshaw	Dave		18.0
Rivers	Jerry	North American Climate, Conservation and Environment	1.1; 1.2; 4.0
Rogers	Amy		2.2; 11.1; 18.0
Safina	Carl		2.2; 11.1; 18.0
Safina	Carl	The Safina Center	2.2; 4.0; 11.1
Sakashita	Miyoko		2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
Savage	Jennifer	Surfrider Foundation	2.1.1; 2.1.2; 2.1.4; 2.2; 2.3; 2.4; 3.1; 4.1; 4.1.1; 4.1.2; 4.2; 7.0 10.0; 15.4; 15.5; 18.0
Scow	Adam	Food and Water Watch	1.1; 1.2; 4.0
Sealese	Pauline	350 Santa Cruz	1.1; 1.2; 4.0
Segee	Brian	Environmental Defense Center	2.1.1; 2.1.2; 2.1.4; 2.2; 2.3; 2.4; 3.1; 4.1; 4.1.1; 4.1.2; 4.2; 7.0 10.0; 15.4; 15.5; 18.0
Shorter	Richard		3.2
Simms	Ellen		2.2; 11.1; 18.0
Sklar	Leonard		2.2; 11.1; 18.0

TABLE A-2 (Cont.)

Last Name	First Name	Organization	Issue Categories
Slaminski	Cathi E.	California Department of Conservation, Division of Oil, Gas, and Geothermal Resources	1.1; 2.3; 3.2; 4.1.2; 13.0; 14.0; 15.3; 17.0; 18.0
Southworth	Greg	Offshore Operators Committee	2.3; 2.5; 3.2; 3.3; 4.1; 4.1.1; 4.2; 6.1; 7.0; 16.1; 16.2
Stamper	Hilary		11.1; 12.0
Stebbins	Barbara	Local Clean Energy Alliance	1.1; 1.2; 4.0
Stone	Mark	California State Assembly, 29th District	2.1.1; 2.1.2; 2.1.3; 2.2; 2.3; 4.0; 6.4; 11.1; 18.0
System	Scott	U.S. EPA Region 9	2.1; 2.3; 3.3; 4.1.2; 4.1.3; 6.1; 8.0; 10.0; 14.0; 18.0
Szasz	Andrew		2.2; 11.1; 18.0
Taylor	James	Carpinteria Valley Association	11.1
Terborgh	John		2.2; 11.1; 18.0
Terris	Shawn	Ventura County Democratic Central Committee	2.2; 4.0; 5.0; 6.4; 11.1
Tershy	Bernie		2.2; 11.1; 18.0
Theiss	Kathryn		2.2; 11.1; 18.0
Thomas	Chuck	Ventura County Air Pollution Control District	4.1.3; 13.0
Thompson	Keith		11.1; 12.0
Tibbs	Pat		11.1
Tripati	Aradhna		2.2; 11.1; 18.0
Valdivia	Abel		2.2; 11.1; 18.0
Verret	Allen	Joint Trades Association	2.3; 2.5; 3.2; 3.3; 4.1; 4.1.1; 4.2; 6.1; 7.0; 16.1; 16.2
Waiya	Mati	Wishtoyo Foundation	2.2; 4.0; 11.1; 15.1
Wechsler	Shoshana	Sunflower Alliance	1.1; 1.2; 4.0
Weiner	Jason	Wishtoyo Foundation	2.2; 4.0; 11.1; 15.1
Wieckowski	Bob	California State Senate, 10th District	2.1.1; 2.1.2; 2.1.3; 2.2; 2.3; 4.0; 6.4; 11.1; 18.0
Wiener	Benjamin		11.1
Williams	Das	California State Assembly, 37th District	2.1.1; 2.1.2; 2.1.3; 2.2; 2.3; 4.0; 6.4; 11.1; 18.0
Wohlander	Jessica	Rootskeeper	1.1; 1.2; 4.0
Wolf	Shaye		2.2; 11.1; 18.0
York	Dan	The Wildlands Conservancy	1.1; 1.2; 4.0
Zavaleta	Erika		2.2; 11.1; 18.0
Zierman	Rock	California Independent Petroleum Association	2.3; 2.5; 3.2; 3.3; 4.1; 4.1.1; 4.2; 6.1; 7.0; 16.1; 16.2
		350 Bay Area	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		350 Marin	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		350 Sacramento	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0

TABLE A-2 (Cont.)

Last Name	First Name	Organization	Issue Categories
		350 Santa Barbara	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		350 Santa Cruz	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		350 Silicon Valley	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		350 Sonoma County	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		350.org	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Alameda Creek Alliance	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Alaska Inter-Tribal Council	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Alliance of Nurses for Healthy Environments	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Asian Pacific Environmental Network	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Ballona Creek Renaissance	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Berks Gas Truth	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Blue Frontier	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Breast Cancer Action	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		California Coastal Protection Network	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		California Young Democrats Environmental Caucus	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Californians for Western Wilderness	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Campaign in favor of offshore hydraulic fracturing	11.2
		Campaign opposed to offshore hydraulic fracturing	2.1.2; 5.0; 6.4; 11.1; 18.0
		Center for Biological Diversity	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Center for Environmental Health	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Center for Food Safety	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Central California Environmental Justice Network	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Chatham Research Group	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Citizens' Climate Lobby, North Orange County	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Citizens Coalition for a Safe Community	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Citizens Committee to Complete the Refuge	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Citizens for Responsible Oil & Gas (CFROG)	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Clean Water Action	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Coastal Environmental Rights Foundation	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Common Sense Design	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0

TABLE A-2 (Cont.)

Last Name	First Name	Organization	Issue Categories
		Community Science Institute (CSI) for Health & Justice	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Courage Campaign	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		CREDO	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Defenders of Wildlife	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Earth Island Institute	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Earthworks	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Elders Climate Action	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Endangered Habitats League	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Endangered Species Coalition	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Environment America	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Environment California	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Environmental Caucus, California Democratic Party	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Environmental Protection Information Center (EPIC)	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Environmental Voices	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Environmental Working Group	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		EPIC–Environmental Protection Information Center	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Equinox Design	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Eyak Preservation Council	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Farmworker Association of Florida	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Flycasters, Inc., of San Jose, CA	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Food and Water Watch	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Food Empowerment Project	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Frack Free LA County	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Fresnans Against Fracking	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Friends of the Earth	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Friends of the Pogonip	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Global Exchange	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Grace Community Church	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Great Egg Harbor Watershed Association	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Greenaction for Health and Environmental Justice	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Greenpeace USA	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Hands Across the Sand	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Idle No More SF Bay	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		International Center for Technology Assessment	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0

TABLE A-2 (Cont.)

Last Name	First Name	Organization	Issue Categories
		International Marine Mammal Project of Earth Island Institute	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		John Muir Project of Earth Island Institute	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Justice Action Mobilization Network (JAMN)	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Kern Environmental Enforcement Network	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		KyotoUSA	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		League of United Latin American Citizens	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Long Beach 350	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Mainstreet Moms	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Mission Blue	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Movement Generation Justice & Ecology Project	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Movement Rights	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Ocean Conservation Research	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Ocean River Institute	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Our Health, Our Future, Our Longmont	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Pacific Coast Federation of Fishermen's Associations (PCFFA)	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Pelican Media	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		People Demanding Action	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Physicians for Social Responsibility	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Physicians for Social Responsibility, San Francisco Bay Area Chapter	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Progressive Democrats of America	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Protect Monterey County	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Public Citizen	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Rainforest Action Network	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Rincon-Vitova Insectaries, Inc.	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Rootskeeper	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		San Francisco Baykeeper	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Santa Barbara Frack Back to Save the Central Coast	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Santa Cruz Climate Action Network	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Save Our Shores	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Save the Sespe	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		SaveWithSunlight	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Sierra Club	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Sierra Club Loma Prieta Chapter	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0

TABLE A-2 (Cont.)

Last Name	First Name	Organization	Issue Categories
		SignOn.org	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		SLO Clean Water.org	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		SLO350	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		SoCal 350 Climate Action	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Solar Wind Works	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Sonoma County Conservation Manager	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		South Bay Los Angeles 350 Climate Action Group	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Spottswode Winery	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Stop Fracking Long Beach	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Sunflower Alliance	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Surfrider Foundation	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Surfrider Foundation West LA/Malibu Chapter	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Tar Sands Action Southern California	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Temple of the United Holy Heart	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		The Little Farm	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		The Shame Free Zone	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		The Story of Stuff Project	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		The Wildlands Conservancy	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Time Laboratory	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Transition Sebastopol Energy Group	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Trash the TPP	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Turtle Island Restoration Network	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		United Native Americans	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Ventura Coastkeeper	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Ventura County Climate Hub	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Ventura Sierra Club	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Whale and Dolphin Conservation	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		WILDCOAST	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		WildEarth Guardians	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		Wishtoyo Foundation	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0
		YumTum Yoga and Ayurveda	2.1.1; 2.2; 4.0; 8.0; 11.1; 18.0

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1 **A.7 REFERENCES**

2
3 Akob, D.M., A.C. Mumford, W.H. Orem, M.A. Engle, J. Grace Klinges, D.B. Kent, and
4 I.M. Cozzarelli, 2016, “Wastewater Disposal from Unconventional Oil and Gas Development
5 Degrades Stream Quality at a West Virginia Injection Facility,” *Environmental Science and
6 Technology*, DOI: 10.1021/acs.est.6b00428.
7

8 CCST (California Council on Science and Technology), 2015, *An Independent Scientific
9 Assessment of Well Stimulation in California, Volume III. Case Studies of Hydraulic Fracturing
10 and Acid Stimulations in Select Regions: Offshore, Monterey Formation, Los Angeles Basin, and
11 San Joaquin Basin*, California Coastal Commission, Sacramento, CA, July.
12

13 Kassotis, C.D., L.R. Iwanowicz, D.M. Akob, I.M. Cozzarelli, A.C. Mumford, W.H. Orem, and
14 S.C. Nagel, 2016, “Endocrine Disrupting Activities of Surface Water Associated with a West
15 Virginia Oil and Gas Industry Wastewater Disposal Site,” *Science of the Total Environment* 557–
16 558: 901–910.
17

18 Petersen, M.D., C.S. Mueller, M.P. Moschetti, S.M. Hoover, A.L. Llenos, W.L. Ellsworth,
19 A.J. Michael, J.L. Rubinstein, A.F. McGarr, and K.S. Rukstales, 2016, *2016 One-year Seismic
20 Hazard Forecast for the Central and Eastern United States from Induced and Natural
21 Earthquakes*, Open-File Report 2016–1035, U.S. Geological Survey. Available at
22 <http://pubs.usgs.gov/of/2016/1035/ofr20161035.pdf>. Accessed May 6, 2016.
23

24 Walsh, R.F., III, and M.D. Zoback, 2015, “Oklahoma’s Recent Earthquakes and Saltwater
25 Disposal,” *Science Advances* 1(5):e1500195. DOI: 10.1126/sciadv.1500195.
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