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Dear Ms. Zavala and Ms. Staples:

The Center for Biological Diversity submits these comments on the *Final Report on the Joint Industry Project Study of Well Treatment, Completion, and Workover Effluents* ("Industry Report").[1] This Report summarized the findings of a two-year industry study of well treatment, completion, and workover effluents discharged directly to surface waters of the Gulf of Mexico.[2] It was submitted to "fulfill … [the participants'] requirement to conduct Characteristic Assessment of treatment, completion, and workover (TCW) discharges under the industry-wide study alternative as required by [National Pollutant Discharge Elimination System (NPDES)] Permits GMG290000 and GEG460000."[3]

Under the current NPDES General Permits that govern discharge into the Gulf of Mexico, offshore oil and gas facilities can discharge massive quantities of polluted wastewater into the ocean. These discharges are permitted despite the fact that the Environmental Protection Agency (EPA) often does not know what chemicals are used in fracking and other well operations, does not know the chemical composition of the waste fluids from these procedures, and has little to no information regarding the impacts of many of these chemicals on human and marine environments. While EPA recently proposed a new NPDES permit for oil and gas facilities in the

[1] AECOM, Final Report: Joint Industry Project Study of Well Treatment, Completion, and Workover Effluents (Sept. 23, 2021) ["Industry Report"].
[2] AECOM (2021) at ix.
[3] Letter from Greg Southworth, Associate Director, Offshore Operators Committee, to Ms. Sylvia Zavala, U.S. Environmental Protection Agency, Region 6 and Ms. Bridget Staples, U.S. Environmental Protection Agency, Region 4, Re: Final Report on the Joint Industry Project Study of Well Treatment, Completion, and Workover Effluents (Sept. 23, 2021).

Western portion of the Gulf—which contains the largest concentration of offshore oil and gas activity in the country—this permit would allow more of the same. Under its draft terms, companies still could discharge unlimited quantities of waste fluids, including fracking chemicals, without adequate understanding of their numerous risks.[4] These risks are compounded by the Inflation Reduction Act, which mandates massive oil and gas leasing in the Gulf of Mexico.

In the face of an imminent and drastic expansion of offshore fracking in the Gulf of Mexico, the dearth of information EPA has when it approves permits for such activity is alarming. As of 2016, EPA had

> identified 1606 chemical associated with hydraulic fracturing, including 1084 chemicals used in hydraulic fracturing fluid and 509 chemicals detected in produced water. ... With new chemicals constantly being added, it is virtually impossible to track them all, or even to just stay up-to-date. The identity of many of these chemicals was unknown, with formulas and physical property information tightly held by the manufacturers as proprietary trade secrets. The hydraulic fracturing fluid chemical additives that were identified had virtually no information available on toxicity or other potentially hazardous properties of the compounds. The fact that these various chemicals with unknown properties may be entering the environment is a concern.[5]

Another article published in 2020 describes "[p]ublicly available toxicological studies on wastewaters associated with unconventional oil and gas (UOG) activities in offshore regions [as] nonexistent."[6]

Despite (and often because of) these lacks of specificity, there remains ample cause for concern. Many substances identified in oil and gas well treatment, completion, and workover fluids are known to be toxic. Volatile organic compounds (VOCs) including ethylbenzene, toluene, and xylenes (all of which are listed as compounds utilized in the Industry Report) can negatively affect the brain and central nervous system, lungs, liver, and kidneys.[7] The oil and gas industry has self-reported fracking products containing dozens of chemicals that are known or possible human carcinogens, regulated under the Safe Drinking Water Act for their risks to human

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[4] *See* 87 Fed. Reg. 43,847 (July 22, 2022); U.S. Envt'l Protection Agency, Proposed General Permit for New and Existing Dischargers in the Offshore Subcategory of the Oil and Gas Extraction Point Source Category for the Western Portion of the Outer Continental Shelf of the Gulf of Mexico, General Permit No. GMG290000 (July 22, 2022).

[5] SOEDER, DANIEL J., FRACKING AND THE ENVIRONMENT: A SCIENTIFIC ASSESSMENT OF THE ENVIRONMENTAL RISKS FROM HYDRAULIC FRACTURING AND FOSSIL FUELS (2021).

[6] Folkerts, Erik J. *et al.*, *Exposure to hydraulic fracturing flowback water impairs* mahi-mahi (Coryphaena hippurus) *cardiomyocyte contractile function and swimming performance*, 54 ENVT'L SCI. & TECH. 13,579 (2020).

[7] Centers for Disease Control and Prevention, *Glossary of Volatile Organic Compounds, at* https://www.cdc.gov/nceh/clusters/fallon/glossary-voc.pdf; U.S. Envt'l Protection Agency, *Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources* (2011); AECOM (2021) at 11, 42, 43, Table A3, Table A6, Table A7.

health,[8] and/or listed as hazardous air pollutants under the Clean Air Act.[9] Fracking chemicals pose risks to wildlife and fisheries as well. For example, exposure to 2.75% hydraulic fracturing flowback water reduced swimming speed, impaired respiration, and compromised cardiac function in mahi-mahi (*Coryphaena hippurus*).[10]

Potential exposure concentrations of chemicals reported in the Industry Report are problematic. Bromine, for example, was reported as present in Category III effluents up to a concentration of 8,850 mg/l (8,850 ppm).[11] The Occupational Health and Safety Administration's permissible exposure limit for bromine is 0.1ppm; effects of exposure range from nausea to contact burns for acute exposure to lung, kidney, and brain damage from long-term exposures.[12] More broadly, all but one of the chemical compounds disclosed and assessed in the Industry Report are classified as very toxic, toxic, or harmful under the Globally Harmonized System (GHS)[13] of acute aquatic hazard.[14] In addition, one of the chemical compounds identified as acutely toxic also is chronically toxic.[15] The risks of these chemicals alongside a number of shortcomings in the study underlying the Industry Report undermine the report's conclusions that well treatment, completion, and workover fluids pose little risk to the aquatic environment.

**Undisclosed Chemicals**

The most significant shortcoming of the Industry Report is its failure to identify and disclose to EPA the vast majority of the chemical constituents discharged into the Gulf of Mexico in treatment, completion, and workover effluents. The failure to disclose these chemicals makes it impossible to adequately assess the toxicity of the effluents and determine if their discharge poses an unacceptable risk to the aquatic environment.

According to the Report, "[s]eventy-five distinct chemical products with 31 product functionalities were used during the study."[16] These products "were typically mixtures and contained inorganic and organic substances that could potentially contribute, in addition to substances picked up downhole, to the observed acute whole effluent toxicity."[17] Products

[8] Committee on Energy and Commerce Minority Staff, U.S. House of Representatives, *Chemicals used in hydraulic fracturing* 8, 11-12 (2011).
[9] McKenzie, Lisa *et al*., *Human health risk assessment of air emissions form development of unconventional natural gas resources*, 424 SCI. TOTAL ENV'T 79 (2012).
[10] *See generally* Folkerts *et al.* (2020).
[11] AECOM (2021) at 72, Table 30. mg/L is equivalent to ppm in aqueous solutions.
[12] Centers for Disease Control & Prevention (CDC), Facts about Bromine (2018); Occupational Safety & Health Admin. (OSHA), Bromine (2020).
[13] *A Guide to The Globally Harmonized System of Classification and Labeling of Chemicals (GHS) 8th Edition* (2019).
[14] AECOM (2021) at 41-42; *id.* at Table A6-A7.
[15] *Id.* at Table A7.
[16] AECOM (2021) at xi, 8, 40. The number of chemical products is 75 if "well cleaner 2" from sample IH80 is included. IH80 was not included in the analyses because the operator determined the sample was not discharged into the Gulf. No information on the acute or chronic toxicity hazard of well cleaner 2 is provided in the report. *But see id.* at 79 ("Participants reported 87 chemical products that were used in formulating TCW fluids discharged to GOM surface water."). No information on the identity, acute or chronic toxicity of the additional 12 chemical compounds (87-75=12) was provided in the Industry Report.
[17] *Id.* at 40; *see also id.* at 79.

functioned as biocides, acid treatments, scale inhibitors, non-emulsifiers, de-foamers, viscosifiers, pH control agents, fluid stabilizers, hydrogen sulfide savengers, non-aqueous base fluids, oxygen scavengers, well casing cleaners, breakers, corrosion inhibitors, corrosion inhibitor intensifiers, surfactants, mud casing scrubbers, clay control chemicals, polymers, cross-linkers, solvents, and activators.[18]

Due to intellectual property concerns, the chemical constituents of many of the products discharged into the Gulf of Mexico were not disclosed to EPA nor were they assessed in the study:

> Trade names of chemical products are not provided to ensure that proprietary information and/or trade secrets are not inadvertently revealed. Instead, chemical additive codes *based on chemical functionality* are used to identify chemical additives used in the study. [Safety Data Sheets (SDSs)] sometimes only list chemicals by functionality, e.g., 'surfactant' rather than by chemical name.[19]

The Industry Report acknowledges that "Performing more comprehensive evaluations would require proprietary information on concentrations of individual substances in chemical products."[20]

Failing to require disclosure of individual substances discharged in treatment, completion, and workover effluents prevents EPA from making a thorough analysis of the risks these chemicals pose to the Gulf of Mexico environment. Chemicals that were disclosed and assessed fell into all three GHS acute aquatic hazard categories: Category 1: Product is very toxic to aquatic life; Category 2: Product is toxic to aquatic life; and Category 3: Product is harmful to aquatic life.[21] Unfortunately, many chemicals were not assessed because the provision of GHS hazard classification data is voluntary in the United States.[22] As a result, for 84% of the 75 chemical products reported,[23] "no aquatic hazard assessment could be made, and thus no conclusion about potential for aquatic toxicity is implied."[24]

The non-disclosure and non-assessment of the actual chemical constituents of the products discharged into the Gulf of Mexico preclude a complete and reasoned analysis of the hazards these substances constitute to marine life. Because industry was not required to disclose what, exactly, their treatment, completion, and workover operations were discharging into the Gulf, the Industry Report relies on surrogates (dissolved organic carbon (DOC), total organic carbon (TOC), total suspended solids (TSS)) to determine which samples were most toxic to their test

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[18] *Id.* at 9-11.
[19] *Id.* at 8-9 (emphasis added).
[20] *Id.* at 43.
[21] *Id.* at 40-41.
[22] *Id.* at 40.
[23] The Industry Report states that no aquatic hazard assessment could be made for 81% of the chemical products reported. An aquatic hazard assessment was made only for twelve chemical compounds. Twelve out of 74 or 75 (*see* fn 16, *supra*) is ~16%, meaning 84% were unassessed. *See also id.* at 79 ("Of the 87 chemical products reported, approximately 85% were identified as 'Not Assessed.'").
[24] *Id.* at xi, 40, 43.

species (the Inland silverside minnow *Menidia beryllina* and mysid *Americamysis bahia*).[25] Statistically significant positive associations were found between minnow toxicity and TOC and DOC for Category I effluents, and for both species and DOC, TOC, and TSS for Category III effluents.[26] The Report offers the watered down and hollow conclusion that "[c]hemical products present in TCW effluents contain primarily organic substances that, based on hazard classification and not considering actual environmental concentrations, could potentially contribute to aquatic toxicity of the TCW effluent samples."[27]

Effluent toxicity to both the Inland silverside minnow (acute 50% median lethal concentration (LC50) 0.2 to >50% effluent) and mysid (LC50 0.05 to 35.2% effluent) was highly variable.[28] The Industry Report found that "[t]his variability appears to be influenced by end-of-pipe treatment, well operation type, stage of the discharge, brine type, and the chemical additives used for each well operation."[29] But the EPA has no way of knowing exactly what chemicals may be the problem because, as explained above, industry does not have to disclose them.

The Industry Report acknowledges that patterns in acute toxicity are likely to be explained by "organics from chemical products and substances from down-hole."[30] Further, "[p]atterns in aquatic toxicity reflected the varying influence of organics and inorganics, i.e., mixture toxicity. This also raises the possibility that synergistic or antagonistic interactions might occur between toxicants with a different toxicological mode of action."[31] Unless and until EPA has complete information on the chemical makeup of the discharged products, the agency will be unable to evaluate the toxicity of the individual chemicals or interacting chemicals and thus unable to ensure adequate protection of Gulf resources. Reliance on the incomplete information provided in this Report to greenlight continued discharge is misplaced.

**Small Sample Size**

The unreasonably small sample size also limits the utility of the Industry Report. Twenty-eight samples obtained from 23 structures in the Western and Central planning areas were evaluated from November 2019 to May 2021.[32] For context, in 2019 and 2020 there were over 200 fracks per year in the Gulf of Mexico across more than 1,800 structures.[33] Without a more representative sample size, EPA is unable to assess adequately the scope and scale of the impacts of well treatment, completion, and workover fluids to Gulf marine ecosystems.

[25] *See id.* at x, 79.
[26] *Id.* at 63, 64.
[27] *Id.* at x, 44.
[28] *Id.* at ix, 46, 76, 78.
[29] *Id.* at ix-x, 46, 59, 76, 78.
[30] *Id.* at 69, 73.
[31] *Id.* at 73; *see also id.* at 75.
[32] Industry Report at ix, 4.
[33] The number of reported fracks was obtained from Freedom of Information Act (FOIA) record requests (2016, 2018) and the BSEE.gov website. *See also* Bureau of Safety & Envt'l Enforcement, *How many platforms are in the Gulf of Mexico?*, at https://www.bsee.gov/faqs/how-many-platforms-are-in-the-gulf-of-mexico.

**Truncated Effects Area**

In addition to a small sample size, the study also improperly truncates the area of impact. The Report focuses on the edge of the mixing zone for its assessment of acute toxicity. The Industry Report concludes that "[f]or substances with measured concentrations, the screening evaluation did not identify any with the potential to cause acute toxicity at the edge of the mixing zone."[34] The Report fails to discuss the potential for acute toxicity closer to the point of discharge or discuss the effects of repeated exposures.[35] The Report also fails to adequately discuss effects from chronic exposure despite the fact some assessed chemicals (e.g., Oil Tracer 1, Activator 1) are known to have chronic effects.[36]

**Improper Comparison to Produced Water**

Finally, the Industry Report's attempts to diminish the environmental effects of treatment, completion, and workover effluents by comparing them to produced water (PW) effects is disingenuous. The Report frames treatment, completion, and workover effluent discharges as a fraction of produced water effluents ("TCW discharges represent a small input to the GOM. An order-of-magnitude estimate of the volume of all TCW discharges in 2019-2021 was 0.01% percent (%) of the volume of produced water (PW) discharges.").[37] While treatment, completion, and workover discharges may be less than produced water discharges, they represents a substantial input of chemicals into Gulf of Mexico waters: 5,006,232 gallons in 2019-2020, according to the Report.[38] The volume of treatment, completion, and workover effluents should be assessed independently of any comparison to produced water inputs—inputs which were not the subject of the Industry Study and Report.

The Industry Report further attempts to diminish the hazards posed by treatment, completion, and workover effluents by stating that "TCW effluents are unlikely to present a greater risk to the receiving environment than PW effluents"[39] and that "TCW effluents are not more (or less) toxic than PW effluents."[40] Again, this represents an attempt to deflect attention from the risks posed by treatment, completion, and workover effluents by comparing them to produced water effluents. The toxicity of treatment, completion, and workover effluents should be assessed independently and without comparison to other point source discharges.

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[34] *Id.* at xi; *see also id.* at 74, 79.
[35] The Report's only discussion of longer-term effects was to downplay their potential toxicity: "For example, the loss of 48-h toxicity to the Mysid in the aged TCW effluent sample AU71 after 24 days suggests that the potential toxicant was either a volatile component, biodegraded, or precipitated from solution (Table 20, Figure 15). The loss of acute Mysid toxicity is also observed in PW effluents for reasons potentially related to volatilization or precipitation (Sauer et al., 1997)." *Id.* at 75.
[36] *Id.* at 42; *id.* at Table A7.
[37] *See id.* at 16, 17; *see also id.* at 76.
[38] *Id.* at 14 (using the values provided in Table 5: 252 discharges * median discharge volume of 473 bbl * 42 gallons/bbl).
[39] *Id.* at x.
[40] *Id.* at 51; *see also id.* at 76.

**Conclusion**

In sum, this Report leaves EPA with little useful information about the toxic effects of treatment, completion, and workover discharges into the Gulf of Mexico. The small sample size, limited assessed area of impact, and non-disclosure of over 80% of the chemical products discharged into Gulf Waters prevents a thorough and reasoned analysis of the impacts. The Industry Report's improper attempts to downplay the impacts of treatment, completion, and workover discharges further taints the Report's conclusions.

The volume of fracking discharges into the Gulf of Mexico may increase dramatically in the coming years. The Inflation Reduction Act reinstates an illegally issued 80 million-acre lease sale in the Gulf of Mexico, requires that Interior hold two additional oil lease sales in the Gulf by September 2023, and requires that the Interior Department offer at least 60 million acres of offshore waters for oil and gas leasing each year as a prerequisite to renewable energy installation. The sheer volume of offshore development required by this law means a staggering amount of waste stands to be discharged into Gulf waters. We request that EPA prohibit the discharge of fracking chemicals into the Gulf of Mexico—both treatment, completion, and workover effluents and produced water effluents—until those substances are proven safe for aquatic life or rendered safe through adequate pre-discharge treatment.

Sincerely,

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cc: Evelyn Rosborough, rosborough.evelyn@epa.gov