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## Ship Happens: Contingency Planning for Deep-Sea Mining in Light of *Exxon Valdez*

Ilsa Harper Luther\*

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\* © 2021 Ilsa Harper Luther. J.D. candidate 2021, Tulane University Law School; B.S. 2017, University of North Carolina at Chapel Hill. Thank you to Professor Adam Babich for his guidance on this Comment and to the members of the *Tulane Law Review* who made this Comment publishable. Thank you to Graham for his endless love and patience. This Comment is dedicated to my Dad. I did not know one human could be filled with so much support, love, knowledge, humor, and generosity. Everything I am today is thanks to him.

## I. INTRODUCTION

With the growing demand for green technologies, renewable energy, and smartphones comes a growing demand for the minerals used to power them.<sup>1</sup> The ambitious Paris Agreement, entered into force on November 4, 2016, committed signatory nations to prioritize efforts to combat climate change.<sup>2</sup> To date, 190 parties have ratified the Agreement.<sup>3</sup> To meet their nationally determined contribution, each nation will need to reduce its dependence on fossil fuels and increase its use of efficient renewable technologies.<sup>4</sup> The World Bank forecasts “that meeting the Paris climate target . . . will require a radical . . . restructuring of energy supply and transmission systems globally.”<sup>5</sup> Energy storage is necessary in almost every green technology industry, including electric vehicles; electricity storage from intermittent power generation sources (wind and solar); and storage for small-scale, home-generated, renewable energy sources.<sup>6</sup> Without more efficient battery technology, complete reliance on renewable energy will remain implausible.<sup>7</sup>

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1. WORLD BANK, THE GROWING ROLE OF MINERALS AND METALS FOR A LOW CARBON FUTURE 7 (2017), <http://documents.worldbank.org/curated/en/207371500386458722/pdf/117581-WP-P159838-PUBLIC-ClimateSmartMiningJuly.pdf> [<https://perma.cc/LR7K-VE3F>]; Rahul Sharma & Samantha Smith, *Deep-Sea Mining and the Environment: An Introduction*, in ENVIRONMENTAL ISSUES OF DEEP-SEA MINING 3, 3 (Rahul Sharma ed., 2019) (“[M]uch of the world is recognizing the need to transition to a clean energy, low-carbon economy, and to do so requires metals used in clean energy infrastructure and technologies. . . .”); Wil S. Hylton, *History’s Largest Mining Operation Is About to Begin*, ATLANTIC (Jan./Feb. 2020), <https://www.theatlantic.com/magazine/archive/2020/01/20000-feet-under-the-sea/603040/> [<https://perma.cc/X4RR-ZNHQ>].

2. Paris Agreement to the United Nations Framework Convention on Climate Change art. 2(1)(a), Apr. 22, 2016, T.I.A.S. No. 16-1104 (entered into force Nov. 6, 2016); *Paris Agreement—Status of Ratification*, U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE, <https://unfccc.int/process/the-paris-agreement/status-of-ratification> [<https://perma.cc/W5G3-W3Q8>] (last visited Apr. 5, 2021); *What Is the Paris Agreement?*, U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE, <https://unfccc.int/process-and-meetings/the-paris-agreement/what-is-the-paris-agreement> [<https://perma.cc/ZPPC-GFWW>] (last visited Apr. 5, 2021).

3. *Paris Agreement—Status of Ratification*, *supra* note 2.

4. See ACHIEVING THE PARIS CLIMATE AGREEMENT GOALS, at xxiii-xxiv (Sven Teske ed., 2019), <https://link.springer.com/content/pdf/10.1007/978-3-030-05843-2.pdf> (finding that to keep global temperature rise below 1.5 degrees Celsius there must be a rapid expansion of renewable technologies).

5. WORLD BANK, *supra* note 1, at 58.

6. *Id.* at 16.

7. *See id.*

Simultaneously, technological advances and smartphone use are on the rise globally.<sup>8</sup> According to the Pew Research Center, 81% of Americans used a smartphone in 2019 as opposed to only 35% in 2011.<sup>9</sup> At the end of 2014, an estimated 1.64 billion people worldwide owned smartphones.<sup>10</sup> Smartphones have become integral to daily human life.<sup>11</sup>

Key metals used in most renewable and smart technologies include aluminum, cobalt, iron, lead, nickel, lithium, and zinc.<sup>12</sup> The World Bank estimates the increase in demand for the minerals relevant to wind technology to be between 150% and 250%, those for solar technology to be 300%, and those for energy storage technology to be over 1,000% over the next thirty years.<sup>13</sup> Traditional land-based sources of these minerals are quickly being depleted.<sup>14</sup> However, the seabed serves as a rich source.<sup>15</sup> The majority of these minerals are found in the “Area,” the deep-sea region outside of coastal states’ exclusive economic zones.<sup>16</sup> Because no one nation has inherent sovereign rights over the Area, the United Nations Convention on the Law of the Sea (UNCLOS) dedicated all resources in the Area to “the common heritage of mankind.”<sup>17</sup> The International Seabed Authority (ISA), an intergovernmental body composed of representatives from

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8. Laura Silver, *Smartphone Ownership Is Growing Rapidly Around the World, but Not Always Equally*, PEW RSCH. CTR. (Feb. 5, 2019), <https://www.pewresearch.org/global/2019/02/05/smartphone-ownership-is-growing-rapidly-around-the-world-but-not-always-equally/> [https://perma.cc/JG3R-WF4N].

9. *Mobile Fact Sheet*, PEW RSCH. CTR. (June 12, 2019), <https://www.pewresearch.org/internet/fact-sheet/mobile/> [https://perma.cc/7QW5-FJ46].

10. Liu Fan et al., *Interactivity, Engagement, and Technology Dependence: Understanding Users’ Technology Utilisation Behaviour*, 36 BEHAV. & INFO. TECH. 113, 114 (2016).

11. *Cell Phone Addiction: The Statistics of Gadget Dependency*, KING UNIV. ONLINE (July 27, 2017), <https://online.king.edu/news/cell-phone-addiction/> [https://perma.cc/W5J9-YQZM].

12. WORLD BANK, *supra* note 1, at 9-10.

13. *Id.* at 12, 14, 17.

14. Rahul Sharma, *Environmental Issues of Deep-Sea Mining*, 11 PROCEDIA EARTH & PLANETARY SCI. 204, 204-05 (2015).

15. Kathryn A. Miller et al., *An Overview of Seabed Mining Including the Current State of Development, Environmental Impacts, and Knowledge Gaps*, FRONTIERS MARINE SCI., Jan. 10, 2018, at 1, <https://www.frontiersin.org/articles/10.3389/fmars.2017.00418/full> [https://perma.cc/TR8J-4GYU].

16. Agreement Relating to the Implementation of Part XI of the Convention of the Law of the Sea of 10 December 1982 art. 1, Nov. 16, 1994, 1836 U.N.T.S. 42; see Miller et al., *supra* note 15, at 6.

17. United Nations Convention on the Law of the Sea art. 136, Dec. 10, 1982, 1833 U.N.T.S. 397 [hereinafter UNCLOS].

each nation that has ratified UNCLOS, oversees the exploration and exploitation of minerals in the Area.<sup>18</sup> Headquartered in Kingston, Jamaica, this “obscure organization”<sup>19</sup> is charged with developing a comprehensive set of regulations to cover all stages of mining activities in the Area.<sup>20</sup> Due to ongoing debate among the representatives, the final draft of the exploitation regulations remain under revision, and until the final draft is adopted, no commercial mining can occur in the Area.<sup>21</sup> The ISA’s publication goal was 2020, signaling that commercial exploitation of the seabed could be a close reality.<sup>22</sup>

However, an increased demand for minerals brings an increased concern for the habitats and marine ecosystems of the seabed where mining for those minerals will take place.<sup>23</sup> While moving from carbon-intensive energy sources is one way to meet climate change goals, “a green technology future is materially intensive and, if not properly managed, could bely the efforts and policies of supplying countries to meet their objectives of meeting climate and related Sustainable Development Goals.”<sup>24</sup> Calls for tougher environmental regulations, or even a moratorium on deep-sea mining, have resonated across the globe, and the calls are getting louder as commercial

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18. *Id.* arts. 156-57. Since the United States is not a signatory to UNCLOS, it does not have representation within the ISA and is left out of all planning, decision making, and gains derived from exploiting the Area. Bill Whitaker, *Why the U.S. Is Missing Out on the Race to Mine Trillions of Dollars Worth of Metals from the Ocean Floor*, CBS NEWS: 60 MINUTES (Nov. 17, 2019), <https://www.cbsnews.com/news/rare-earth-elements-u-s-on-sidelines-in-race-for-metals-sitting-on-ocean-floor-60-minutes-60-minutes-2019-11-17/> [<https://perma.cc/8AEP-QA9Z>].

19. Hylton, *supra* note 1; Whitaker, *supra* note 18.

20. UNCLOS, *supra* note 17, art. 157.

21. *Draft Exploitation Regulations*, INT’L SEABED AUTH., <https://www.isa.org/jm/mining-code/ongoing-development-regulations-exploitation-mineral-resources-area> [<https://perma.cc/YW4D-VW8E>] (last visited Apr. 5, 2021); *Summary of February 2020 ISA Meetings*, OCEAN MINING INTEL (Mar. 9, 2020), [https://oceanminingintel.com/insights/summary-of-february-2020-isa-meetings?utm\\_source=Ocean+Mining+Intel&utm\\_campaign=64b02a9a0b-EMAIL\\_CAMPAIGN\\_2020\\_03\\_09\\_08\\_58&utm\\_medium=email&utm\\_term=0\\_ea375840cc-64b02a9a0b-162967421](https://oceanminingintel.com/insights/summary-of-february-2020-isa-meetings?utm_source=Ocean+Mining+Intel&utm_campaign=64b02a9a0b-EMAIL_CAMPAIGN_2020_03_09_08_58&utm_medium=email&utm_term=0_ea375840cc-64b02a9a0b-162967421) [<https://perma.cc/NB97-SKXH>]; see Aline Jaeckel, *Strategic Environmental Planning for Deep Seabed Mining in the Area*, 114 MARINE POL’Y 1, 1 (2019) (stating that no exploitation will take place until regulations have been published).

22. *Negotiations Advance on Regulations for Exploiting Seabed Mineral Resources*, OCEAN MINING INTEL (Mar. 9, 2020), [https://oceanminingintel.com/news/regulation/negotiations-advance-on-regulations-for-exploiting-seabed-mineral-resources?utm\\_source=Ocean+Mining+Intel&utm\\_campaign=64b02a9a0b-EMAIL\\_CAMPAIGN\\_2020\\_03\\_09\\_08\\_58&utm\\_medium=email&utm\\_term=0\\_ea375840cc-64b02a9a0b-162967421](https://oceanminingintel.com/news/regulation/negotiations-advance-on-regulations-for-exploiting-seabed-mineral-resources?utm_source=Ocean+Mining+Intel&utm_campaign=64b02a9a0b-EMAIL_CAMPAIGN_2020_03_09_08_58&utm_medium=email&utm_term=0_ea375840cc-64b02a9a0b-162967421) [<https://perma.cc/SFV6-GDGM>].

23. Jaeckel, *supra* note 21, at 1.

24. WORLD BANK, *supra* note 1, at 59.

exploitation nears.<sup>25</sup> In 2019, for example, the President of Fiji pleaded, “I ask you all to . . . support a 10-year moratorium on seabed mining from 2020 to 2030 which would allow for a decade of proper scientific research of our economic zone and territorial waters.”<sup>26</sup>

The ISA and member States, who regulate mining in their territorial waters, follow the environmental framework laid out in UNCLOS.<sup>27</sup> However, it is still unclear how strictly that will be enforced or maintained.<sup>28</sup> The oil industry has the potential to serve as a learning tool for the deep-sea mining industry. Looking at the regulation failures that led to one of the most severe marine pollution incidents in United States’ history, the *Exxon Valdez* oil spill, one can see that even the best-laid plans can fail. Government and public policy experts agree that the extent of the damage could have been minimized if national, state, and industry policies were enforced.<sup>29</sup>

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25. MINING WATCH CANADA ET AL., WHY THE RUSH? SEABED MINING IN THE PACIFIC OCEAN 1 (2019) [hereinafter WHY THE RUSH?], <http://www.deepseaminingoutofourdepth.org/wp-content/uploads/Why-the-Rush.pdf> [<https://perma.cc/4CNV-GG8A>]; Ben Doherty, *Collapse of PNG Deep-Sea Mining Venture Sparks Calls for Moratorium*, GUARDIAN (Sept. 15, 2019, 2:00 AM), <https://www.theguardian.com/world/2019/sep/16/collapse-of-png-deep-sea-mining-venture-sparks-calls-for-moratorium> [<https://perma.cc/H6JK-P2Q2>]; Daniel O. B. Jones et al., *Existing Environmental Management Approaches Relevant to Deep-Sea Mining*, 103 MARINE POL’Y 172, 172 (2019) (“In some cases societal concerns have stopped or delayed planned seabed mining projects.”); *International Seabed Authority Under Pressure Over Deep-Sea Mining Impacts*, WORLD OCEAN INITIATIVE (Aug. 16, 2019), <https://www.woi.economist.com/international-seabed-authority-under-pressure-over-deep-sea-mining-impacts/> [<https://perma.cc/4VYZ-4U3A>].

26. Doherty, *supra* note 25 (quoting President Frank Bainimarama).

27. UNCLOS, *supra* note 17, arts. 145, 192, 194, 208; Jaeckel, *supra* note 21, at 1.

28. See Jaeckel, *supra* note 21, at 2 (noting that the ISA recognizes the need for an environmental policy framework but has failed to specify any details about what that would entail).

29. ALASKA OIL SPILL COMM’N, SPILL: THE WRECK OF THE EXXON VALDEZ: IMPLICATIONS FOR SAFE MARINE TRANSPORTATION, at i-ii (1990), <https://www.arlis.org/docs/vol1/EVOS/1990/21337991.pdf> [<https://perma.cc/3P4Z-R599>]; SAMUEL K. SKINNER & WILLIAM K. REILLY, NAT’L RESPONSE TEAM, THE EXXON VALDEZ OIL SPILL: A REPORT TO THE PRESIDENT 1 (1989), <https://nepis.epa.gov/Exe/ZyPDF.cgi/10003M19.PDF?Dockey=10003M19.PDF> [<https://perma.cc/SP6D-4P2F>]; see also NAT’L COMM’N ON THE BP DEEPWATER HORIZON OIL SPILL & OFFSHORE DRILLING, DEEP WATER: THE GULF OIL DISASTER AND THE FUTURE OF OFFSHORE DRILLING, at vi-vii (2011) [hereinafter BP REPORT TO THE PRESIDENT], <https://www.govinfo.gov/content/pkg/GPO-OILCOMMISSION/pdf/GPO-OILCOMMISSION.pdf> [<https://perma.cc/D74M-FBAF>] (discussing how the *Deepwater Horizon* disaster could have been similarly prevented). The State of Alaska tasked the Alaska Oil Spill Commission, composed of experts in government and public affairs, to determine how the *Exxon Valdez* accident occurred and to propose ways to prevent such a disaster from occurring again. ALASKA OIL SPILL COMM’N, *supra*, at i. The President of the United States also requested the National Response Team, consisting of fourteen governmental agencies, “to address preparedness for, the response to, and the early lessons learned from the *Exxon Valdez* oil spill.” SKINNER & REILLY, *supra*, at 1.

Adverse effects from mining activities are inevitable.<sup>30</sup> No plan can account for every possible contingency that is guaranteed to occur during large-scale, experimental projects such as deep-sea mining.<sup>31</sup> However, the likelihood of potential disasters can be minimized through tough enforcement and oversight to ensure those tasked with response operations are prepared to fully execute the written contingency plans. This Comment argues that as deep-sea mining ventures are undertaken in the coming years, the ISA, sponsoring nations, and private industries should not forget the lessons learned from the *Exxon Valdez* oil spill. Accidents will happen, and the mining industry must be prepared with quick and effective response plans, as well as the equipment and financing to carry them out. This will involve coordination between international, state, and private entities and strict oversight by the ISA.

Part II of this Comment explains the background of seabed mining, including the process, the current state of commercial exploration, and environmental concerns related to deep-sea mining operations. Part III dives deeper into the United Nations Convention on the Law of the Sea and the Exploitation Regulations. Part IV analyzes the *Exxon Valdez* oil spill and makes comparisons between the oil and seabed mining industries. Part V addresses the need for strong oversight by the ISA to ensure remedial measures are ready to go. Finally, Part VI concludes by summarizing the precautions the industry should adopt.

## II. A DIVE INTO THE ABYSS OF DEEP-SEA MINING

Commercial interest in seabed mining is not a new phenomenon. Exploitation began in the 1870s when explorers found polymetallic manganese nodules in the Atlantic Ocean.<sup>32</sup> In the 1960s, successful diamond mining operations began in the shallow waters off the coast

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30. See Andrea Koschinsky et al., *Deep-Sea Mining: Interdisciplinary Research on Potential Environmental, Legal, Economic, and Societal Implications*, 14 INTEGRATED ENV'T ASSESSMENT & MGMT. 672, 672-73 (2018); Ahmed Ahnert & Christian Borowski, *Environmental Risk Assessment of Anthropogenic Activity in the Deep Sea*, 7 J. AQUATIC ECOSYSTEM STRESS & RECOVERY 299, 303-04 (2000).

31. See BP REPORT TO THE PRESIDENT, *supra* note 29, at viii (recognizing that “complex systems almost always fail in complex ways” (quoting 1 COLUM. ACCIDENT INVESTIGATION BD., REPORT 6 (2003))).

32. Philip P.E. Weaver & David Billett, *Environmental Impacts of Nodule, Crust and Sulphide Mining: An Overview*, in ENVIRONMENTAL ISSUES OF DEEP-SEA MINING, *supra* note 1, at 27, 28; WHY THE RUSH?, *supra* note 25, at 4.

of Namibia and are still going strong today.<sup>33</sup> Recently, in 2011, Papua New Guinea granted a seabed mining license to Nautilus Minerals, Inc. to exploit the minerals located within its exclusive economic zone.<sup>34</sup>

Historically, deep-sea operations have struggled due to the high capital costs of machinery and limited technology.<sup>35</sup> Recently, however, advances in technology combined with the increased price and demand of rare earth elements are fueling a surge of interest in deep-sea mining ventures.<sup>36</sup> No commercial deep-sea mining operations are currently taking place; however, several exploration contracts have been awarded to survey the Area for seafloor massive sulfides, ferromanganese crusts, and manganese nodules.<sup>37</sup> Only once the ISA publishes its comprehensive set of regulations for deep-sea mining can commercial extraction of minerals begin.<sup>38</sup>

#### A. *The Basics of Deep-Sea Mining*

The metals of greatest interest to future mining projects are found within seafloor massive sulfides, ferromanganese crusts, and manganese nodules.<sup>39</sup> Manganese nodules (also referred to as polymetallic or ferromanganese nodules)<sup>40</sup> were first discovered in 1873 by the crew of the *HMS Challenger*.<sup>41</sup> They are “potato-like” spheres, between one and twenty-five centimeters in diameter, that

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33. Hylton, *supra* note 1; *Seafloor Mining*, WOODS HOLE OCEANOGRAPHIC INST., <https://www.whoi.edu/know-your-ocean/ocean-topics/ocean-resources/seafloor-mining/> [<https://perma.cc/WFH7-8UGC>] (last visited Apr. 5, 2021); Kaul Gena, *Deep Sea Mining of Submarine Hydrothermal Deposits and Its Possible Environmental Impact in Manus Basin, Papua New Guinea*, 6 *PROCEDIA EARTH & PLANETARY SCI.* 226, 227 (2013).

34. Doherty, *supra* note 25; WHY THE RUSH?, *supra* note 25, at 4. This exploration did not go well. Papua New Guinea invested over \$157 million into the Solwara I project to mine hydrothermal vents in its EEZ. Doherty, *supra* note 25. Unfortunately, the money dried up about halfway through the project, and Nautilus Marine will be liquidated. *Id.*

35. See Doherty, *supra* note 25; Hylton, *supra* note 1; *Seafloor Mining*, *supra* note 33. The “deep sea” is defined as the area covered by more than 200 meters of seawater, with the majority of it composed of abyssal plain deeper than 3,000 meters. Miller et al., *supra* note 15, at 2. The deep sea is still a mysterious and unknown landscape, largely unexplored by scientists. *Id.* This lack of knowledge creates an additional barrier to mining projects, particularly when managing and determining potential environmental impacts. *Id.*

36. Hylton, *supra* note 1; Whitaker, *supra* note 18.

37. Miller et al., *supra* note 15, at 1; Hylton, *supra* note 1.

38. *International Seabed Authority Under Pressure Over Deep-Sea Mining Impacts*, *supra* note 25.

39. Miller et al., *supra* note 15, at 2; Weaver & Billett, *supra* note 32, at 27.

40. Ahnert & Borowski, *supra* note 30, at 303.

41. *Exploration Contracts*, INT’L SEABED AUTH., <https://www.isa.org.jm/deep-seabed-minerals-contractors> [<https://perma.cc/2W9B-JPXJ>] (last visited Apr. 5, 2021).

grow in vast fields along the abyssal plains.<sup>42</sup> The nodules contain metals such as manganese, nickel, copper, cobalt, molybdenum, and rare earth elements (REEs).<sup>43</sup> Cobalt and REEs are used largely in rechargeable batteries, electric cars, and green technologies.<sup>44</sup>

Seafloor massive sulfides (SMS) contain other valuable minerals. SMS develop at hydrothermal vents found along mid-oceanic ridges.<sup>45</sup> Volcanic plumes expelled from vents contain metals from Earth's upper crust.<sup>46</sup> When the plumes mix with seawater, they precipitate to the seafloor—creating mineral deposits.<sup>47</sup> Hydrothermal vent communities are largely unexplored, but scientists do know that they host a wide variety of chemosynthetic species.<sup>48</sup>

Ferromanganese crusts (also known as cobalt rich crusts)<sup>49</sup> are concentrated on mid-Pacific seamounts and serve as rich sources of manganese, iron, and cobalt, which are used in jet engines and batteries.<sup>50</sup> Unlike individual nodules, ferromanganese crusts form as “pavement-like encrustations” ranging in thickness from a few millimeters to fifteen centimeters.<sup>51</sup> Seamounts contain a high level of biodiversity and provide important hunting and feeding grounds and navigational structures for migrating species,<sup>52</sup> which will likely be disturbed by anthropogenic interferences.

To collect these minerals, all proposed systems for seabed mining will use some form of a seabed mineral collector to harvest the nodules, a “lifting system,” and vessels on the surface to collect and transport the ores, with some variations depending on the type and location of mineral being collected.<sup>53</sup> The current proposed method uses nodule harvesters that will “plough, scrape, and/or vacuum the seafloor over large areas.”<sup>54</sup> The minerals are then pumped up to vessels on the

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42. Miller et al., *supra* note 15, at 2; Ahnert & Borowski, *supra* note 30, at 303.

43. Miller et al., *supra* note 15, at 2-3; Ahnert & Borowski, *supra* note 30, at 303.

44. Miller et al., *supra* note 15, at 5.

45. *Id.* at 3; Weaver & Billett, *supra* note 32, at 27.

46. Weaver & Billett, *supra* note 32, at 31.

47. *Id.*

48. Miller et al., *supra* note 15, at 3-4; Gena, *supra* note 33, at 230.

49. Ahnert & Borowski, *supra* note 30, at 303; PIPPA HOWARD ET AL., FAUNA & FLORA INT'L, AN ASSESSMENT OF THE RISKS AND IMPACTS OF SEABED MINING ON MARINE ECOSYSTEMS 13 (2020).

50. Miller et al., *supra* note 15, at 4.

51. Ahnert & Borowski, *supra* note 30, at 303.

52. Miller et al., *supra* note 15, at 4.

53. *Id.* at 9; Whitaker, *supra* note 18; Ahnert & Borowski, *supra* note 30, at 303.

54. Lisa A. Levin et al., *Defining “Serious Harm” to the Marine Environment in the Context of Deep-Seabed Mining*, 74 MARINE POL'Y 245, 250 (2016).

surface through a riser pipe, where they are separated from the surrounding water and sediment in a process called “dewatering.”<sup>55</sup> The excess water, nutrients, and sediment are discarded back to the ocean.<sup>56</sup>

### B. Environmental Concerns

While humans will undoubtedly prosper from the wealth of materials extracted from the seafloor, if done improperly, humans are also at risk from the damage the industry will inflict on the deep-sea ecosystem.

The world knows little about what lies at the bottom of the deep oceans, but scientists believe it is “a secret ecosystem” with undiscovered species that are likely to reveal more about evolution and life on Earth at every level of the food chain.<sup>57</sup> As one renowned biologist explained, “[t]he depths of our oceans remain largely unexplored, but humankind’s first tentative ventures into the blue abyss have revealed a hidden world full of wonders, where life thrives under great barometric pressure and far from the light of the sun.”<sup>58</sup> Bacteria and microbes that have the potential to serve as efficient carbon sinks and lifesaving antibiotics have already been recovered from the ocean.<sup>59</sup> A group of marine researchers from Fauna & Flora International argue that the ISA failed to account for these contributions when it evaluated common heritage as the mineral wealth “without recognition or due consideration of the broader suite of functions and services the deep sea provides for humanity.”<sup>60</sup>

Partly because of the lack of baseline data about the deep sea, short- and long-term environmental impacts of deep-sea mining are

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55. Gena, *supra* note 33, at 231; Whitaker, *supra* note 18; Ahnert & Borowski, *supra* note 30, at 303.

56. Levin et al., *supra* note 54, at 250-53.

57. Hylton, *supra* note 1.

58. HOWARD ET AL., *supra* note 49, at 5 (quoting Sir David Attenborough).

59. Karen McVeigh, *Scientists Fear Impact of Deep-Sea Mining on Search for New Medicines*, GUARDIAN (May 20, 2019, 4:00 AM), <https://www.theguardian.com/environment/2019/may/20/scientists-fear-impact-of-deep-sea-mining-on-search-for-new-medicines> [<https://perma.cc/ETQ3-69N2>]. For example, scientists recently discovered a microbe from a deep-sea sponge that can fight “antibiotic resistant superbugs.” *Id.* Scientists also believe these sponges could be a source for cancer-fighting drugs. *Id.*

60. HOWARD ET AL., *supra* note 49, at 11.

largely unknown.<sup>61</sup> One study noted that “[a]lthough the potential effects of mining have been investigated for decades, the ecology of these remote areas is still poorly understood. To what extent and timescale these ecosystems would be affected by, and could recover from, mining disturbance remains unclear.”<sup>62</sup> In general, many of the environmental concerns will be site-specific and depend on the physical and chemical composition of the area and the mining technology used.<sup>63</sup> Despite the lack of data, some impacts are certain, including direct damage to the seafloor;<sup>64</sup> release of effluents (foreign nutrients, toxins, and sediment) from the extraction process;<sup>65</sup> and chemical and physical disruptions at the surface.<sup>66</sup>

Even more difficult to predict are the possible accidents that could occur through hydraulic fluid leaks, fuel spills, ore spills, equipment malfunction, or collisions between barges and bulk ore carriers.<sup>67</sup> If these spills occur near the surface, the ore and fuel discharge will degrade the water quality of the surface waters and precipitate to the

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61. Ahnert & Borowski, *supra* note 30, at 304; Jones et al., *supra* note 25, at 172; Levin et al., *supra* note 54, at 249; Michael Lodge et al., *Seabed Mining: International Seabed Authority Environmental Management Plan for the Clarion-Clipperton Zone. A Partnership Approach*, 49 MARINE POL’Y 66, 69 (2014) (“[T]he [ISA] has expressed its concern over the lack of raw data associated with environment baseline studies and noted that the insufficient quantity and quality of such data also represents an impediment to the validity of a regional environmental management plan.”).

62. Erik Simon-Lledó et al., *Biological Effects 26 Years After Simulated Deep-Sea Mining*, SCIENTIFIC REPS., May 29, 2019, at 1. This came from a study of a simulated mining area off the coast of Peru where substantial damage was still evident twenty-six years after the initial disturbance. *Id.* The disturbed site demonstrated markedly lower diversity and distinct faunal composition as opposed to areas untouched by mining operations. *Id.* at 7.

63. See Koschinsky et al., *supra* note 30, at 677.

64. Nodule removal itself will remove a significant amount of the hard substrate on which fauna and organisms rely. Ahnert & Borowski, *supra* note 30, at 304; Levin et al., *supra* note 54, at 250.

65. Fine muds disturbed at the mining site will resettle on the bottom, suffocating benthic organisms and filter feeders. Ahnert & Borowski, *supra* note 30, at 305-06. An early study calculated that about 20,000 cubic meters of sediment per day will be disturbed from an industrial mining operation. *Id.* at 305.

66. The habitat not only of the seafloor but also of the entire water column will most likely undergo damage from pollution dumped during extraction, byproduct discarded during the dewatering process, or while the ore is transported to the surface. Gena, *supra* note 33, at 230-31; Hylton, *supra* note 1; Sharma, *supra* note 14, at 206; Weaver & Billett, *supra* note 32, at 54. Redistributing particles from the seafloor into the uppermost level of the water column could block light penetration damaging photosynthetic organisms and add new nutrient sources, which would affect microbial processes. Koschinsky et al., *supra* note 30, at 676; Sharma, *supra* note 14, at 205. This is not going to be minimal, either. For example, an estimated 2.5 to 5.5 tons of sediment is expected to be resuspended per ton of manganese nodules mined. *Id.*

67. Gena, *supra* note 33, at 231; Sharma & Smith, *supra* note 1, at 12.

seafloor, smothering fauna.<sup>68</sup> Further, the fallout from marine pollution accidents is expensive.<sup>69</sup> The cleanup from the *Exxon Valdez* oil spill cost an estimated \$1.85 billion in the first year, on top of the \$25 million in damage to the vessel and the \$3.4 million in lost cargo.<sup>70</sup> Similarly, after the *Deepwater Horizon* oil spill in the Gulf of Mexico in 2010, British Petroleum (BP) was ordered to pay \$4 billion in criminal fines and penalties<sup>71</sup> and \$20.8 billion in civil fines to the United States.<sup>72</sup> By 2018, BP's total monetary payout in relation to the spill was estimated to be between \$60 billion and \$145 billion.<sup>73</sup>

Fortunately, UNCLOS and the ISA's Exploitation Regulations reflect a move toward a more environmentally conscious industry; however, many still oppose the Exploitation Regulations as not doing enough for environmental protection. The next Part explains this conflict in greater detail by discussing the regulatory framework behind seabed mining operations, the structure and role of the ISA, and the current proposed draft of the Exploitation Regulations.

### III. UNCLOS, THE ISA, AND THE MINING CODE

#### A. *Regulatory Framework: Sovereign States vs. the ISA*

The foundational regulatory framework for deep-sea mining operations in the Area is contained in the United Nations Convention on the Law of the Sea (UNCLOS). UNCLOS Part XI establishes the delineation of rights and regulations that govern mineral extraction in

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68. Gena, *supra* note 33, at 231; Sharma, *supra* note 14, at 205-06.

69. Jones et al., *supra* note 25, at 172.

70. NAT'L TRANSP. SAFETY BD., MARINE ACCIDENT REPORT: GROUNDING OF THE U.S. TANKSHIP *EXXON VALDEZ* ON BLIGH REEF, PRINCE WILLIAM SOUND NEAR VALDEZ, ALASKA MARCH 24, 1989, at v (1990).

71. *Summary of Criminal Prosecutions*, U.S. ENV'T PROT. AGENCY, [https://cfpub.epa.gov/compliance/criminal\\_prosecution/index.cfm?action=3&prosecution\\_summary\\_id=2468](https://cfpub.epa.gov/compliance/criminal_prosecution/index.cfm?action=3&prosecution_summary_id=2468) [<https://perma.cc/LM6M-Y5UZ>] (last visited Apr. 5, 2021).

72. *Deepwater Horizon Oil Spill Settlements: Where the Money Went*, NAT'L OCEANIC & ATMOSPHERIC ADMIN. (Apr. 20, 2017), <https://www.noaa.gov/explainers/deepwater-horizon-oil-spill-settlements-where-money-went> [<https://perma.cc/3L24-CGRG>] (last visited Apr. 5, 2021).

73. See Yong Gyo Lee et al., *Ultimate Costs of the Disaster: Seven Years After the Deepwater Horizon Oil Spill*, 29 J. CORP. ACCT. & FIN. 69, 69 (2018) (\$144.89 billion); Ron Bousso, *BP Deepwater Horizon Costs Balloon to \$65 Billion*, REUTERS (Jan. 16, 2018, 1:20 AM), <https://www.reuters.com/article/us-bp-deepwaterhorizon/bp-deepwater-horizon-costs-balloon-to-65-billion-idUSKBN1F50NL> [<https://perma.cc/692C-JHZL>] (\$65 billion); Alexa Lardieri, *BP Takes \$1.7 Billion Charge on Deepwater Horizon; Costs Now Top \$65B*, U.S. NEWS & WORLD REP. (Jan. 16, 2018), <https://www.usnews.com/news/national-news/articles/2018-01-16/bp-takes-17-billion-charge-on-deepwater-horizon-costs-now-top-65b> (\$65 billion).

the Area and those that govern in a member State's exclusive economic zone (EEZ).<sup>74</sup>

As described in Part I of this Comment, in the Area, the ISA governs mining operations, and exploitation is carried out by either the Enterprise, which is the operational arm of the ISA,<sup>75</sup> or a state-sponsored entity, which is either the State itself or a private corporation with state sponsorship.<sup>76</sup> States have the responsibility to ensure that any state-sponsored corporations and individuals who conduct activities within the Area comply with the regulations laid out in UNCLOS Part IX.<sup>77</sup>

States have the responsibility to form national legislation in accordance with UNCLOS and the standards set by the ISA, which will be enforced within their territorial waters and exclusive economic zones.<sup>78</sup> UNCLOS Part XII sets forth the general rights of States to explore and exploit their natural resources, as well as the general obligation "to protect and preserve the marine environment."<sup>79</sup> States must adopt laws, regulations, and other measures "to prevent, reduce and control pollution of the marine environment from any source" using "best practicable means."<sup>80</sup> Several actions States "shall" take to fulfill their obligations include developing contingency plans; monitoring, assessing, and reporting risks or effects of pollution; and enforcing all regulations developed pursuant thereof.<sup>81</sup>

The ISA possesses an "international legal personality and such legal capacity as may be necessary for the exercise of its functions and the fulfillment of its purposes."<sup>82</sup> As a trustee, the ISA also has the duty

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74. *What Is the EEZ?*, NAT'L OCEAN SERV., <https://oceanservice.noaa.gov/facts/eez.html> [<https://perma.cc/RZP8-ZLJP>] (Feb. 26, 2021).

75. UNCLOS, *supra* note 17, art. 170.

76. *Id.* arts. 137, 153.

77. *Id.* art. 139. However, a sponsoring State is not subject to strict liability; rather, a State is protected from liability for damage caused by a state-sponsored contractor if the State has adopted appropriate laws and regulations. *Id.* Annex III, art. 4.

78. *Id.* Pt. XII. The territorial sea is defined as no more than twelve nautical miles from the low water line along the coast of the particular State. The exclusive economic zone is confined to 200 nautical miles from the State's low water line. *Id.* arts. 3, 57.

79. *Id.* art. 192; Robin Warner, *International Environmental Law Principles Relevant to Exploitation Activity in the Area*, 114 MARINE POL'Y 1, 1 (2020).

80. UNCLOS, *supra* note 17, arts. 194, 208. These "best practicable means" must be no less stringent than the relevant international rules. Warner, *supra* note 79, at 2.

81. UNCLOS, *supra* note 17, arts. 198, 199, 204.

82. *Id.* art. 176.

to protect the Area from harm.<sup>83</sup> UNCLOS article 145 provides that appropriate rules must be formulated by the ISA for “the prevention, reduction and control of pollution and other hazards to the marine environment . . . [and] the protection and conservation of the natural resources of the Area.”<sup>84</sup> The ISA must take “[n]ecessary measures” to ensure protection from any damaging effects of mining in the Area.<sup>85</sup>

The ISA is also tasked with reviewing and approving plans of work from the Enterprise, States, and private state-sponsored entities who wish to exploit the seabed in the Area.<sup>86</sup> The Exploitation Regulations set out the qualifications that an applicant must fulfill in order to have a valid application. One requirement is an environmental plan that, after review by the ISA, is published online for comment by the general public, and then the ISA determines the applicant’s financial and technical capabilities and whether the Plan of Work should be approved.<sup>87</sup>

Although extractions in international waters cannot begin until the publication of the regulations, the ISA has already awarded thirty fifteen-year exploratory licenses to private contractors.<sup>88</sup> Part of the contractual terms requires the contractors to conduct environmental studies to obtain a baseline from which to predict and gauge their environmental impact.<sup>89</sup> The exploration contracts can either be renewed for further exploration, or, if and when the regulations are published, they can be converted into exploitation contracts for commercial mining projects.<sup>90</sup>

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83. HOWARD ET AL., *supra* note 49, at 11 (“The concept of the common heritage of mankind promotes the uniform application of the highest standards for the protection of the marine environment and the safe development of activities in the Area.”).

84. UNCLOS, *supra* note 17, art. 145(a)-(b).

85. *Id.*

86. *Id.* Annex III, art. 3.

87. Int’l Seabed Authority [ISA], *Draft Regulations on Exploitation of Mineral Resources in the Area*, Pt. II, ISA Doc. ISBA/26/C/CRP.1 (Dec. 17, 2019) [hereinafter *Exploitation Regulations Draft*], [https://ran-s3.s3.amazonaws.com/isa.org.jm/s3fs-public/files/documents/collation\\_of\\_specific\\_drafting\\_suggestions\\_for\\_posting\\_0.pdf](https://ran-s3.s3.amazonaws.com/isa.org.jm/s3fs-public/files/documents/collation_of_specific_drafting_suggestions_for_posting_0.pdf) [https://perma.cc/NY72-YR9Y].

88. *Exploration Contracts*, *supra* note 41. The majority of the contracts have been granted for operations in the largest mining site, the Clarion-Clipperton Fracture Zone, a field of polymetallic nodules stretching 4,500 miles across the Pacific Ocean. *Id.*; Hylton, *supra* note 1.

89. Lodge et al., *supra* note 61, at 67.

90. *Id.* at 66-67.

### B. *The Mining Code*

To carry out its responsibility of regulating mining operations in the Area, the ISA is currently promulgating the aptly named “Mining Code.” It will contain “the whole of the comprehensive set of rules, regulations and procedures issued by [the] ISA to regulate prospecting, exploration and exploitation of marine minerals in the . . . Area.”<sup>91</sup> Currently, the ISA has published three individual codes for each type of mineral that will be mined in the Area and a draft of the proposed Exploitation Regulations. Together, these will make up the Mining Code.<sup>92</sup> The regulations must be established in accordance with the 1982 UNCLOS and the 1994 Implementing Agreement relating to deep-sea mining.<sup>93</sup> Those wishing to exploit the Area, whether the Enterprise, a member State itself, or a corporation, must comply with the requirements set forth in the Mining Code.

The ISA published a draft of the Exploitation Regulations with proposed edits from the Legal and Technical Commission (an arm of the ISA) in December 2019.<sup>94</sup> The Legal and Technical Commission suggested revisions, including the addition of provisions emphasizing environmental protection from harmful effects of mining.<sup>95</sup> For example, the suggestions would require contractors to take all possible measures to avoid causing “[s]erious [h]arm” to the environment and promulgate Regional Environmental Management Plans for exploitation areas.<sup>96</sup>

Further, all applications to exploit the Area “shall” include an Emergency Response and Contingency Plan (the Contingency Plan).<sup>97</sup> According to Annex V, the Contingency Plan must be “in accordance with Good Industry Practice[,] . . . [p]rovide an effective plan of action for . . . [the] efficient response to Incidents and events,” and specify how the applicant will cooperate with other relevant entities on response operations.<sup>98</sup> “Incident” is defined as an event that results in a

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91. *The Mining Code*, INT’L SEABED AUTH., <https://www.isa.org.jm/mining-code> [<https://perma.cc/93M7-SGUT>] (last visited Apr. 5, 2020).

92. Koschinsky et al., *supra* note 30, at 680-82.

93. *The Mining Code*, *supra* note 91.

94. *Exploitation Regulations Draft*, *supra* note 87, at 1.

95. *Id.* pmb1., 8.

96. *Id.* Regulation 2(e)ter.

97. *Id.* Regulation 7(3)(e). Unlike the Environmental Management Plan, the Contingency Plan does not have to undergo a public comment process. *See id.* Regulation 11.

98. *Id.* Annex V(a)-(b).

marine casualty involving either “severe damage to the environment”<sup>99</sup> or “[s]erious [h]arm to the Marine Environment,”<sup>100</sup> which means “any effect from activities in the Area on the Marine Environment which represents a significant adverse change in the Marine Environment.”<sup>101</sup> The applicant must demonstrate they have “[s]ufficient financial resources for the prompt execution and implementation” of the Contingency Plan and the “capability to respond effectively to Incidents.”<sup>102</sup> Once the contract is awarded, the contractor must maintain the “currency and adequacy” of the Contingency Plan and the resources needed for the prompt execution of the plan, as well as consult with the ISA and the sponsoring state.<sup>103</sup> Much of the Exploitation Regulation is based on a self-reporting system,<sup>104</sup> but inspectors from the ISA and/or the contractor’s sponsoring State may “inspect any relevant documents or items which are necessary to monitor the Contractor’s compliance.”<sup>105</sup>

While this draft put some focus on environmental protection, comments submitted in response to the draft insisted more could be done to protect the marine environment.<sup>106</sup> Critics emphasized the need for stricter “[i]nspection, compliance and enforcement” of environmental regulations and mining companies’ internal procedures.<sup>107</sup>

The next Part highlights how the impacts from one of the United States’ most devastating marine pollution disasters, the grounding of the oil tanker *Exxon Valdez*, could have been minimized if government and industry players had exercised proper oversight and enforcement powers. When formulating the final draft of the Exploitation Regulations, these lessons must be at the forefront of the ISA’s mind.

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99. *Casualties*, INT’L MAR. ORG., <http://www.imo.org/en/OurWork/MSAS/Casualties/Pages/Default.aspx> [<https://perma.cc/M6JW-4JB9>] (last visited Apr. 5, 2021).

100. *Exploitation Regulations Draft*, *supra* note 87, Schedule: Use of Terms and Scope.

101. *Id.*

102. *Id.* Regulations 13(2)(b)(iii), 13(3)(d).

103. *Id.* Regulation 53(1).

104. *Id.* Regulation 51(a) (requiring the contractor to “[m]onitor and report annually . . . on the Environmental Effects”).

105. *Id.* Regulation 96(4); McVeigh, *supra* note 59.

106. Int’l Seabed Authority [ISA], *Comments on the Draft Regulations on the Exploitation of Mineral Resources in the Area*, at 4-5, ISA Doc. ISBA/26/C/2 (Dec. 6, 2019) [hereinafter *Comments on the Draft Regulations*], <https://isa.org/jm/files/files/documents/26-c-2-en.pdf> [<https://perma.cc/NJB7-DSH3>]. For example, some commented on the need for more research on mining discharge before moving forward and to define terms such as “environmental management plans” and “environmental impact statements.” *Id.* at 4, 13.

107. *Id.* at 5.

IV. THE *EXXON VALDEZ* OIL SPILL

While commercial deep-sea mining projects will require companies to dive into uncharted waters, the oil drilling and transportation industry can provide useful guidance. Oil exploitation and transport has a long history in the United States. Geologists and engineers took the development of the industry “blow-by-blow,” learning from failures along the way.<sup>108</sup> One of these major “blows” was the *Exxon Valdez* oil spill off the coast of Alaska in 1989.

What is most devastating about the grounding of the *Exxon Valdez* oil tanker was that it was avoidable. When the *Exxon Valdez* left port on the evening of March 23, 1989, tankers had safely navigated out of Prince William Sound carrying crude oil from the trans-Alaska pipeline over 8,000 times.<sup>109</sup> The channel was well-charted, yet the *Exxon Valdez* still grounded on Bligh Reef, spilling over ten million gallons of crude oil into the pristine Alaskan sound and damaging 1,000 miles of coastline.<sup>110</sup> That evening, an inebriated master of the *Exxon Valdez* left the bridge, leaving an unqualified, exhausted, and overworked third mate at the helm—a violation of both United States Coast Guard regulations and Exxon Shipping policy.<sup>111</sup> Prior to this accident, the master had completed over one-hundred roundtrip voyages through Prince William Sound and had served as master when the *Exxon Valdez* was named “the best performer in the fleet.”<sup>112</sup> Before leaving the helm, the master directed the vessel out of the shipping lane to avoid ice floes, which was a routine maneuver for him but comparatively difficult for a tired third mate and an understaffed crew.<sup>113</sup> These conditions created the perfect opportunity for disaster. As the National Transportation Safety Board found in its study, the master “was giving his responsibility for the vessel’s safety to crewmembers whose capabilities were diminished at the very time that navigation was

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108. BP REPORT TO THE PRESIDENT, *supra* note 29, at 22.

109. ALASKA OIL SPILL COMM’N, *supra* note 29, at 1-2.

110. *Id.* at 2; Stephen Haycox, “Fetched Up”: *Unlearned Lessons from the Exxon Valdez*, 99 J. AM. HIST. 219, 219 (2012); SKINNER & REILLY, *supra* note 29, at 12; *Investigation of the Exxon Valdez Oil Spill, Prince William Sound, Alaska: Oversight Hearings Before the H. Subcomm. on Water, Power & Offshore Energy Res.*, 101st Cong. 552 (1990) [hereinafter *Investigation of the Exxon Valdez*].

111. Haycox, *supra* note 110, at 221-22; NAT’L TRANSP. SAFETY BD., *supra* note 70, at v, 8, 31. The master was estimated to have a BAC of 0.2% at the time of the grounding. NAT’L TRANSP. SAFETY BD., *supra* note 70, at 123.

112. NAT’L TRANSP. SAFETY BD., *supra* note 70, at 28-29.

113. Haycox, *supra* note 110, at 222; NAT’L TRANSP. SAFETY BD., *supra* note 70, at 122, 137.

becoming complex and demanding and also at the very time that a failure to navigate correctly and precisely could result in very grave consequences.”<sup>114</sup>

Similar to UNCLOS and the Mining Code, when oil operations began in Valdez, Alaska, the State enacted statutes to address environmental stewardship and protection efforts.<sup>115</sup> The government passed regulations and trained oil tanker crews to ensure the preservation of Prince William Sound.<sup>116</sup> In 1971, in preparation for oil activities to begin, the Alaskan government bestowed upon themselves the right to “conserve, improve, and protect [Alaska’s] natural resources and environment and control water, land, and air pollution, in order to enhance the health, safety, and welfare of the people of the state and their overall economic and social well-being.”<sup>117</sup> Over the following two decades, however, the oil industry fought to weaken state environmental laws.<sup>118</sup>

Between all interested parties, there were a total of six contingency plans addressing response operations for an oil spill in Prince William Sound.<sup>119</sup> But despite all the preparation on paper, “the company, federal, and state responses to the accident were failures, exacerbating a disaster that might have been significantly mitigated had various agencies worked together within the framework of an adequate, comprehensive, coordinated, and enforced plan.”<sup>120</sup>

Alyeska Pipeline Company, the terminal operator at Valdez, had a state-approved contingency plan in place as required by the Alaska

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114. NAT’L TRANSP. SAFETY BD., *supra* note 70, at 122.

115. ALASKA OIL SPILL COMM’N, *supra* note 29, at ii.

116. *Id.*

117. ALASKA STAT. § 46.03.010(a) (1971); *see also id.* §§ 46.03.010(b), 46.03.020, 46.03.040, 46.03.750 (establishing Alaska’s Department of Environmental Conservation and plan for enforcement).

118. *National Oil Spill Contingency Planning and Response Capabilities: Hearing Before the Subcomm. on Investigations & Oversight of the H. Comm. on Pub. Works & Transp.*, 101st Cong. 263 (1989) [hereinafter *National Oil Spill Contingency Planning*]; *see Chevron U.S.A., Inc. v. Hammond*, 726 F.2d 483, 1984 AMC 1027 (9th Cir. 1984) (challenging the constitutionality of an Alaskan environmental statute regulating the discharge of ship’s ballast water); Haycox, *supra* note 110, at 221; ALASKA OIL SPILL COMM’N, *supra* note 29, at 20 (discussing *Chevron U.S.A.*, 726 F.2d 483, 1984 AMC 1027).

119. SKINNER & REILLY, *supra* note 29, at 6-8; NAT’L TRANSP. SAFETY BD., *supra* note 70, at 86. These six plans were: The Alyeska Plan, The Captain of the Port Prince William Sound Pollution Action Plan, a Regional Contingency Plan, The National Contingency Plan, the State of Alaska Contingency Plan and Response Program, and The Exxon Plan. SKINNER & REILLY, *supra* note 29, at 6-8. The scope of this Comment does not permit the full evaluation of each individual plan.

120. Haycox, *supra* note 110, at 223.

Department of Environmental Conservation, but the industry was wholly unprepared to apply it to a spill of this magnitude.<sup>121</sup> The contingency plan stated that Alyeska would be in charge of cleanup operations if an incident such as the *Exxon Valdez* grounding occurred, but even Exxon admitted that it knew Alyeska would not be able to respond to a spill from one of its supertankers.<sup>122</sup> The Alaska Department of Environmental Compliance approved the plan despite several shortcomings. For example, the plan did not provide guidance on how to implement the strategies<sup>123</sup> and did not require response technology be ready for deployment.<sup>124</sup>

When it came time to implement the contingency plans after the *Exxon Valdez* grounded, Alyeska and Exxon were unprepared and uncoordinated.<sup>125</sup> Exxon had no “formal” agreements that Alyeska would be the first responder, and Alyeska said Exxon would “probably” take over a major spill.<sup>126</sup> The Commissioner of the Alaska Department of Environmental Conservation stated that “about 18 hours into the spill, it became clear that Alyeska was not responding under the conditions of the contingency plan and that neither Alyeska nor Exxon appeared to be able to carry out the requirements of the plan.”<sup>127</sup> For years before the incident, oil companies had grown generally complacent.<sup>128</sup> For example, in 1981, eight years before the crash, Alyeska disbanded its full-time oil spill team.<sup>129</sup> Despite running drills

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121. *National Oil Spill Contingency Planning*, *supra* note 118, at 263; SKINNER & REILLY, *supra* note 29, at 9; *Investigation of the Exxon Valdez*, *supra* note 110, at 370; NAT’L TRANSP. SAFETY BD., *supra* note 70, at 86.

122. SKINNER & REILLY, *supra* note 29, at 6; Haycox, *supra* note 110, at 221.

123. SKINNER & REILLY, *supra* note 29, at 6, 9. The plan was site-specific and addressed equipment, response actions, sensitive areas to be protected, spill trajectories, cleanup, disposal and restoration, and fish and wildlife resources for a variety of spill sizes. *Id.* at 6.

124. NAT’L TRANSP. SAFETY BD., *supra* note 70, at 144. The plan did not state that the contingency barge had to be loaded with oil response equipment, and, in fact, it was not ready when response operations began. *Id.* at 144-45.

125. *National Oil Spill Contingency Planning*, *supra* note 118, at 263; SKINNER & REILLY, *supra* note 29, at 9.

126. NAT’L TRANSP. SAFETY BD., *supra* note 70, at 99.

127. *Id.* at 92 (quoting Commissioner of the Alaska Department of Environmental Conservation).

128. *National Oil Spill Contingency Planning*, *supra* note 118, at 263; *see* Chevron U.S.A., Inc. v. Hammond, 726 F.2d 483, 1984 AMC 1027 (9th Cir. 1984) (challenging the constitutionality of an Alaskan environmental statute regulating the discharge of ship’s ballast water); Haycox, *supra* note 110, at 221; ALASKA OIL SPILL COMM’N, *supra* note 29, at 20 (discussing *Chevron U.S.A.*, 726 F.2d 483, 1984 AMC 1027).

129. Office of Response and Restoration, *Looking Back: What Led up to the Exxon Valdez Oil Spill?*, NAT’L OCEANIC & ATMOSPHERIC ADMIN. (Mar. 12, 2014), <https://response.gov>.

as required, Alyeska failed to implement any of the critiques in response to the drills.<sup>130</sup> Further, the specified contingency barge, which was to provide containment equipment at the site of any spill, was undergoing repairs at the time and lacked necessary equipment.<sup>131</sup> Other supplies needed for the cleanup and containment of the spill were in storage at the terminal and took additional time to mobilize.<sup>132</sup> The contingency plan allocated two-and-a-half hours to prepare the equipment, but in reality it took ten.<sup>133</sup> This “demonstrated a lack of preparation on the part of Alyeska and the need to have such equipment readily available.”<sup>134</sup> Within hours of the crash, the Coast Guard, Alyeska, and Exxon began calling in resources from across the nation and the world to bring supplies to assist in the cleanup efforts.<sup>135</sup> Getting people, supplies, and communications into the remote fishing village of Valdez, Alaska, and then out to the wreckage, proved to be another slow and difficult process.<sup>136</sup>

Shortly thereafter, Alyeska handed the response efforts over to Exxon.<sup>137</sup> Unfortunately, Exxon had no Alaska-approved contingency plan.<sup>138</sup> The Exxon Shipping Company’s Casualty Response Plan was a voluntary document that did not require approval by state entities, was not site-specific or detail-specific, and did not mention any common oil response tools.<sup>139</sup>

In addition to the industry’s efforts, or lack thereof, the federal government responded pursuant to the National Contingency Plan (NCP), mobilizing the National Response Team and the Coast Guard.<sup>140</sup> Per the NCP, federal funds will only be expended if the On-Scene Coordinator (OSC) determines the responsible party is acting

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restoration.noaa.gov/oil-and-chemical-spills/significant-incidents/exxon-valdez-oil-spill/looking-back-what-led-exxon-val [https://perma.cc/ZR4U-N63T].

130. *Id.*; SKINNER & REILLY, *supra* note 29, at 8.

131. NAT’L TRANSP. SAFETY BD., *supra* note 70, at 90; SKINNER & REILLY, *supra* note 29, at 12. The barge, even without the equipment, was up to the standards of the Alyeska contingency plan, but not to the standards of the Alaska Department of Environmental Conservation, who approved the plan regardless. NAT’L TRANSP. SAFETY BD., *supra* note 70, at 144.

132. NAT’L TRANSP. SAFETY BD., *supra* note 70, at 145.

133. *Id.*

134. *Id.*

135. *Id.* at 89.

136. SKINNER & REILLY, *supra* note 29, at 13.

137. Haycox, *supra* note 110, at 223.

138. NAT’L TRANSP. SAFETY BD., *supra* note 70, at 99.

139. SKINNER & REILLY, *supra* note 29, at 8.

140. *Id.* at 16, 21.

ineffectively.<sup>141</sup> Despite recognition that Alyeska was floundering, the OSC initially decided not to take over.<sup>142</sup> The Coast Guard, in accordance with the NCP, “assumed [its] customary duties: investigating the accident and oil spill, assessing the situation, monitoring the removal actions, and providing guidance and assistance as necessary for the cleanup activities.”<sup>143</sup> Alaska joined the efforts early on, as well. The “Governor declared a state disaster and implemented the Alaska Emergency Plan.”<sup>144</sup> The Alaska Department of Environmental Conservation operated independently of the federal response actions in securing recovery equipment.<sup>145</sup>

With all the individual players participating in the cleanup, “[b]lurry lines of authority complicated the work at every juncture.”<sup>146</sup> The three bodies—the federal government, Exxon Shipping, and the Alaska Department of Environmental Conservation—eventually coordinated the response efforts, and the Coast Guard took over organization as the magnitude of the cleanup escalated.<sup>147</sup> The necessity of a federal takeover of the cleanup “underscored the complacency and lack of planning that were common prior to the spill and pointed to the need for clarifying lines of authority and salient definitions before future accidents.”<sup>148</sup>

Local communities were devastated as a result of the spill.<sup>149</sup> Sea otters, harbor seals, birds, fauna, and microbial populations suffered, while communities whose population depended on fishing and hunting lost their only sources of livelihood.<sup>150</sup> Cleanup operations ceased in the summer of 1991, but plenty of oil still remained.<sup>151</sup>

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141. *Id.* at 21.

142. NAT’L TRANSP. SAFETY BD., *supra* note 70, at 144.

143. *Id.*

144. SKINNER & REILLY, *supra* note 29, at 16.

145. *Id.*

146. Haycox, *supra* note 110, at 225.

147. SKINNER & REILLY, *supra* note 29, at 21; Haycox, *supra* note 110, at 225.

148. Haycox, *supra* note 110, at 225.

149. *Id.* at 219.

150. *Id.* at 219, 226-27.

151. *Id.* at 226.

V. EFFECTIVE CONTINGENCY PLANNING FOR DEEP-SEA MINING:  
LESSONS FROM EXXON

A. *Industry Corruption and Complacency*

Once commercial deep-sea mining begins and nations and companies begin to realize the wealth, the rush to mine faster could lead to similar trends experienced in the oil industry.<sup>152</sup> As the Alaska Oil Spill Commission observed, “[e]fficiency in a competitive world dominated by profit is all important in the oil transportation business.”<sup>153</sup> In the case of the *Exxon Valdez* grounding, the elaborate system designed “to prevent error from becoming disaster” succumbed to powerful industry forces.<sup>154</sup>

Already, “[mining] [c]ompanies and their investors, hungry for profits, are driving a speculative rush for seabed minerals.”<sup>155</sup> The deep-sea mining industry is forecasted to generate revenues of two billion dollars a year, or a possible seven billion dollars by the end of 2026, with the likelihood of rapid growth.<sup>156</sup> Similar to what the oil industry was able to do in 1979 when it challenged Alaskan state statutes that imposed what the industry saw as intrusive safeguards, wealthy forces within the mining industry are likely to wield the same power.<sup>157</sup>

Additionally, long before the *Exxon Valdez* incident, industry and government grew complacent to safety regulations, which left them unprepared to respond to a spill.<sup>158</sup> The continued success of oil transport “bred complacency; complacency bred neglect; neglect increased the risk—until the right combination of errors finally led to an accident of disastrous proportions.”<sup>159</sup> Currently, many members of the ISA and independent organizations are vigilant about the need for stricter environmental protections before they will permit commercial

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152. See BP REPORT TO THE PRESIDENT, *supra* note 29, at 25-27; WHY THE RUSH?, *supra* note 25, at 1-2.

153. ALASKA OIL SPILL COMM’N, *supra* note 29, at 3.

154. *Id.*

155. WHY THE RUSH?, *supra* note 25, at 1.

156. HOWARD ET AL., *supra* note 49, at 52; *International Seabed Authority Under Pressure Over Deep-Sea Mining Impacts*, *supra* note 25.

157. *Chevron U.S.A., Inc. v. Hammond*, 726 F.2d 483, 483, 1984 AMC 1027, 1028 (9th Cir. 1984); *Haycox*, *supra* note 110, at 221. All the provisions in these invalidated laws were exactly the elements that led to the *Exxon Valdez* oil spill. *Haycox*, *supra* note 110, at 221.

158. ALASKA OIL SPILL COMM’N, *supra* note 29, at 13.

159. *Id.* at 2.

mining operations to begin.<sup>160</sup> This vigor cannot be allowed to slip, as it did in Alaska.<sup>161</sup>

*B. Enforcement, Oversight, and Cooperation*

The greatest defense against environmental damage from anthropogenic activities is, of course, prevention. As they say, “an ounce of prevention is worth a pound of cure.”<sup>162</sup> Most of the regulations set forth in the Exploitation Regulations and requirements for the ISA and member States under UNCLOS address anticipated impacts and precautionary measures.<sup>163</sup> What *Exxon Valdez* demonstrates is that some of the most dire consequences can come from an unanticipated occurrence.<sup>164</sup> For that reason, it is imperative that the ISA exercise tough enforcement powers and mandate response plans from industry and sponsoring states that are ready to be implemented.

One of the most effective steps the ISA can take in ensuring responsible development of the seabed is to carefully select the recipients of its exploitation contracts.<sup>165</sup> The draft of the Exploitation Regulations requires the Commission to consider whether the applicant has the technological and financial capabilities to execute its Emergency Response and Contingency Plan in the event of an accident.<sup>166</sup> This will be effective to an extent, but there is still a recognized need for more enforcement and oversight power for the ISA or the flag state.<sup>167</sup>

The ISA must have the power to inspect, run emergency drills, and enforce modifications or improvements as needed. This need was highlighted in the *Exxon Valdez* response where, despite the

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160. See *Comments on the Draft Regulations*, *supra* note 106, at 4-5 (discussing how parties are concerned about the lack of environmental regulations, liability, and compliance and enforcement mechanisms in the draft exploitation regulations).

161. See ALASKA OIL SPILL COMM’N, *supra* note 29, at 1 (“In government as well as industry, enforcement zeal declined, alertness sagged and complacency took root in the years preceding the *Exxon Valdez* disaster.”).

162. SKINNER & REILLY, *supra* note 29, at 10.

163. See *Exploitation Regulations Draft*, *supra* note 87, Annex IV (discussing requirements for an environmental impact statement); see also Lodge et al., *supra* note 61, at 68-69 (describing the environmental management plan).

164. Haycox, *supra* note 110, at 222; NAT’L TRANSP. SAFETY BD., *supra* note 70, at v, 8, 31. The master was estimated to have a BAC of 0.2% at the time of the grounding. NAT’L TRANSP. SAFETY BD., *supra* note 70, at 123.

165. Warner, *supra* note 79, at 1.

166. *Exploitation Regulations Draft*, *supra* note 87, Regulations 13(2)(b), 13(3)(d).

167. *Comments on the Draft Regulations*, *supra* note 106, at 5.

requirement that contingency equipment was loaded and ready to deploy, Alyeska neither required such in its plan nor had the equipment ready when the spill occurred.<sup>168</sup> Clear penalties, whether financial or criminal, must be prescribed for any violation of the requirements.

Next, the ISA has to ensure all applicable response plans can work together efficiently. The *Exxon Valdez* response was substantially hindered due to the lack of communication and coordination between the parties.<sup>169</sup> All parties involved in a mining expedition—the ISA, the sponsoring State, and the corporation—will have their own protocols for responding to an accident. The ISA should evaluate contingency plans in light of the sponsoring State’s national cleanup or response plan and require the contractor to explain how its plan will work in conjunction with other parties.

### C. *Industry Ambitions Outpace Technology*

At the time of the *Exxon Valdez* grounding, shipping technology had far outpaced the development of equipment to respond to an accident.<sup>170</sup> Alyeska, even if it intended to comply with Alaska’s laws, did not have the capabilities to remedy a spill from a supertanker the size of *Exxon Valdez*. Similar concerns have been raised about the state of technology with deep-sea mining.<sup>171</sup>

Of critical importance in the case of deep-sea mining is planning for unforeseeable environmental accidents in remote areas. The *Exxon Valdez* spill response efforts were hindered and made much more difficult due to the “limited accommodations” of Valdez, Alaska.<sup>172</sup> First, it was difficult to get people and supplies into the town.<sup>173</sup> Then, it was still a two-hour voyage to the spill site in Prince William Sound.<sup>174</sup> Similarly, mining in the Area will take place outside of a nation’s EEZ, so the likelihood of an accident occurring in a very remote location is high. The contingency plans that contractors submit must recognize this and give realistic response timelines and practical initiatives to minimize the hurdle. Advances in cleanup and response technology will be pivotal for this to work.

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168. NAT’L TRANSP. SAFETY BD., *supra* note 70, at 144-45.

169. Haycox, *supra* note 110, at 225.

170. *Investigation of the Exxon Valdez*, *supra* note 110, at 371.

171. Doherty, *supra* note 25.

172. SKINNER & REILLY, *supra* note 29, at 13.

173. *Id.*

174. *Id.*

#### D. Standards and Interpretation

The Exploitation Regulations framework does not state the standard of remediation for which the mining companies or individual nations are responsible. This issue of “how clean is clean” is common in environmental remediation laws.<sup>175</sup> In the case of the *Exxon Valdez*, the federal coordinator ended the response efforts declaring the site had been cleaned. However, that “was open to interpretation.”<sup>176</sup> Twenty years later, oil was still washing onto the shore, and local animal populations had not recovered.<sup>177</sup> The same problem may present itself in the context of seabed mining accidents. The ISA needs to dictate a clear-cut remediation standard. Currently, the draft of the Exploitation Regulations only provides the contractor must show it has the “capability to respond effectively to Incidents.”<sup>178</sup> This leaves what is “effective” up to interpretation and is a far cry from a bright-line remediation standard.

Different parties with different priorities, interests, and capabilities “may have competing ideas about health risks at a site, when is it clean enough, [and] what . . . ‘clean’ even mean[s].”<sup>179</sup> A number of factors contribute to the interpretation of what is “clean,” including “social, economic, institutional, political, and cultural factors.”<sup>180</sup> The ISA, the sponsoring State, and the private mining company may all have different concepts of what a satisfactory cleanup effort looks like. This standard should not be left “open to interpretation,”<sup>181</sup> but rather mandated by the ISA in the Exploitation Regulations.

#### VI. CONCLUSION

Similar to oil, society is growing more and more dependent on the technology powered by minerals found in the seabed. Also similar to oil, minerals are a nonrenewable resource. As the land supply of high-demand minerals runs low, the deep seabed offers a potential alternate source. However, harvesting the seabed is not a perfect substitute. The

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175. See Keely Maxwell et al., *How Clean Is Clean: A Review of the Social Science of Environmental Cleanups*, 13 ENV'T RSCH. LETTERS 1, 1, 2 (2018).

176. Haycox, *supra* note 110, at 226.

177. *Id.*

178. *Exploitation Regulations Draft*, *supra* note 87, Regulations 13(2)(b)(iii), 13(3)(d).

179. Maxwell et al., *supra* note 175, at 2.

180. *Id.*

181. Haycox, *supra* note 110, at 226.

deep-sea environment is largely unexplored. Coupled with the uncertainties associated with deep-sea mining, this makes venturing into the abyss to harvest resources especially risky. Looking to the fallout after the *Exxon Valdez* oil spill can offer some lessons when going forward with crafting strict environmental regulations for deep-sea mining.

This Comment focused on contingency regulations the ISA needs to implement before allowing commercial mineral extraction to begin. These include maintaining strict oversight and inspection powers, preventing industry complacency and corruption, developing technology that can better handle environmental cleanup after an accident, and formulating bright-line standards for mining companies and sponsoring States. The ISA must strike a delicate balance between providing resources for human development and protecting the marine environment.