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## ARTICLES

### Disclosing Hazards to Oil Spill Cleanup Workers: An Empirical Analysis

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*Disasters such as the 2010 BP oil spill in the Gulf of Mexico inevitably lead to significant cleanup activities. Entities organizing cleanup activities are subject to a patchwork of federal and state rules requiring them to disclose hazards—for example, hazards posed by oil or chemical dispersants—to cleanup workers through material safety data sheets (MSDS).*

*First, we observe that the patchwork nature of these rules undercuts the ability of cleanup workers to actually receive the MSDS for the hazardous chemicals they may contact. That is unfortunate because—as shown later through our empirical analysis—reviewing the MSDS has a statistically significant impact on workers’ willingness to participate in cleanup efforts, both as (unpaid) volunteers and as (paid) employees.*

*Second, we ask: can MSDS disclosure itself be improved? Our empirical analysis shows it can. Our experimental manipulations show that personal*

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*anecdotes—both real-life descriptions of exposure to chemicals experienced by workers in prior oil spill cleanups and descriptions by former workers of Later-Manifested Physical Conditions (LMPC)—have a statistically significant impact on individuals’ willingness to participate in cleanup activities. The effect was seen for willingness to participate as both a volunteer and as a paid employee, and the effect was stronger than for the MSDS that meet current disclosure standards. When forty percent or more of the anecdotes included descriptions of health ailments, wage demands also went up meaningfully. Thus, it appears there is value in expanding the depth of disclosure in the MSDS—i.e., how deep the disclosure goes—rather than focusing solely on the breadth of disclosure—i.e., what hazards cleanup organizers must disclose.*

*Given our empirical findings, we make two recommendations: (1) lawmakers should harmonize the patchwork of rules to facilitate disclosure of hazards by the MSDS, and (2) lawmakers should increase the depth of disclosure by requiring that the MSDS include personal anecdotes by former cleanup workers (or instructions on how workers can access such personal anecdotes via a government-run website).*

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## INTRODUCTION

On April 20, 2010, the Deepwater Horizon mobile offshore drilling unit experienced a loss of well control, which led to explosions, fires, and the loss of eleven lives onboard.<sup>1</sup> The nearly mile-deep blowout of the Macondo oil well was difficult to control and led to a massive release of hydrocarbons, including oil that flowed into the Gulf of Mexico (hereinafter the “Gulf Oil Spill”).<sup>2</sup> Although initial estimates from the U.S. Coast Guard’s Federal On-Scene Coordinator placed the spill’s flow rate at roughly 1,000 barrels of oil per day,<sup>3</sup> the final report of the Flow Rate Technical Group to the National

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1. See OFF. OF MAR. ADM’R, REPUBLIC OF MARSH. IS., DEEPWATER HORIZON MARINE CASUALTY INVESTIGATION REPORT i (2011), [https://www.register-iri.com/wp-content/uploads/Republic\\_of\\_the\\_Marshall\\_Islands\\_DEEPWATER\\_HORIZON\\_Marine\\_Casualty\\_Investigation\\_Report-Low\\_Resolution.pdf](https://www.register-iri.com/wp-content/uploads/Republic_of_the_Marshall_Islands_DEEPWATER_HORIZON_Marine_Casualty_Investigation_Report-Low_Resolution.pdf) [<https://perma.cc/JJU4-G9A8>].

2. See *id.* at i, 3.

3. U.S. COAST GUARD, BP DEEPWATER HORIZON OIL SPILL: INCIDENT SPECIFIC PREPAREDNESS REVIEW (ISPR) 29 (2011), <https://www.hsd1.org/?view&did=7347> [<https://perma.cc/P33R-VBMN>].

Incident Command placed the flow rate at 53,000 barrels of oil per day, with a total release of 4.9 million barrels.<sup>4</sup>

Because the Gulf Oil Spill could be only partially contained, the oil held the potential to harm environmentally sensitive areas along the coastlines, and numerous commercial businesses and personal pastimes, including fishing and tourism.<sup>5</sup> For this reason, tens of thousands of people rushed to mitigate the potential damage of the spill, either as formal incident cleanup employees or as volunteers.<sup>6</sup> At the time of the release of the U.S. Coast Guard's Incident Specific Preparedness Review in 2011, roughly 48,000 personnel were listed as responders to the incident across four command posts, located in the states of Texas, Louisiana, Alabama, and Florida.<sup>7</sup> Later estimates set the number who worked on cleanup efforts at 170,000 people.<sup>8</sup> Altogether, there were forty-seven offers of assistance from governments or entities outside the United States.<sup>9</sup>

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4. Marcia K. McNutt et al., *Review of Flow Rate Estimates of the Deepwater Horizon Oil Spill*, 109 PROC. NAT'L ACAD. SCI. U.S. 20260, 20262-63 (2012).

5. Leslie Kaufman & Campbell Robertson, *Gulf Coast Towns Brace as Huge Oil Slick Nears Marshes*, N.Y. TIMES (May 1, 2010), <https://www.nytimes.com/2010/05/02/us/02spill.html> [<https://perma.cc/N3QB-C48A>]; *Factbox: Gulf Oil Spill Impacts Fisheries, Wildlife, Tourism*, REUTERS (May 30, 2010, 11:41 AM), <http://www.reuters.com/article/idUSTRE64T23R20100530> [<https://perma.cc/35BR-FUEA>].

6. See Joseph Berger, Brian Knowlton & Henry Fountain, *Dispersal of Oil Means Cleanup to Take Years*, *Official Says*, N.Y. TIMES (June 7, 2010), <https://www.nytimes.com/2010/06/08/us/08spill.html> [<https://perma.cc/3YXQ-V2LT>] (“[T]he Coast Guard has had to recruit a flotilla of volunteers, hundreds of boats that will be equipped with booms and skimming devices, to clean up the scattered oil.”); Press Release, Chellie Pingree, U.S. Representative, *Gulf Oil Spill: How You Can Help* (May 19, 2010) (“[C]ontractors engaged by BP and the US Coast Guard to clean up the gulf oil spill [are] looking for up 3,000 people to work in Alabama, Mississippi and Louisiana for the next several months cleaning up the oil spill . . . . Agencies have mobilized thousands of volunteers to react to the disaster.”). The use of volunteers in removal and remediation efforts during the Gulf Oil Spill occurred despite specific discouragement from regulations promulgated in 1994, stating that volunteers should only provide “beach surveillance, logistical support, and bird and wildlife treatment.” 40 C.F.R. § 300.185(c). Following the Gulf Oil Spill, the National Response Team (NRT) published guidelines for the use of volunteers. See U.S. NAT'L RESPONSE TEAM, *USE OF VOLUNTEERS GUIDELINES FOR OIL SPILLS* (2012), [https://www.nrt.org/sites/2/files/NRT\\_Use\\_of\\_Volunteers\\_Guidelines\\_for\\_Oil\\_Spills\\_FINAL\\_signature\\_s\\_inserted\\_Version\\_28-Sept-2012.pdf](https://www.nrt.org/sites/2/files/NRT_Use_of_Volunteers_Guidelines_for_Oil_Spills_FINAL_signature_s_inserted_Version_28-Sept-2012.pdf) [<https://perma.cc/TGW7-SP5G>]. It states, “Volunteers should normally only be used in very low risk activities and only after receiving appropriate safety training. For example, assistance in the command post, logistics, staging areas and check-in require relatively little training and are minimal risk activities.” *Id.* at 18-19. Unfortunately, this guidance document does not change anything. It is less authoritative than the regulation, and even if it did carry the weight of law, it is just as permissive as the regulation (i.e., using language like “should normally”).

7. U.S. COAST GUARD, *supra* note 3, at 156.

8. Mark A. D'Andrea & G. Kesava Reddy, *Health Consequences Among Subjects Involved in Gulf Oil Spill Clean-up Activities*, 126 AM. J. OF MED. 966, 966 (2013).

9. Governments providing assistance included Canada, Mexico, Norway, Japan, France, UK, Tunisia, Belgium, Qatar, Kenya, China, Russia, Netherlands, Sweden, and the European Union. U.S. COAST GUARD, *supra* note 3, at 156 n.6.

It is common for individuals to want to help in disaster situations.<sup>10</sup> (Generally, we will refer to these individuals collectively as “workers.” However, at times, it will be necessary for us to refer to them more precisely as “employees” when they are compensated and “volunteers” when they are not compensated). This willingness to help may expose those workers to health risks that could impact their lives and livelihoods over the long term.<sup>11</sup> Unfortunately, evidence shows that workers involved with oil spill cleanup efforts are not fully aware of the health risks those activities pose.<sup>12</sup> This is despite mandatory risk disclosure requirements under the Occupational Safety and Health Act (OSH Act) administered by the Occupational Safety and Health Administration (OSHA), OSHA-approved state plans, OSHA HAZWAPER regulations, and Environmental Protection Agency (EPA) HAZWAPER regulations.<sup>13</sup> In addition, the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) requires “Community Right-to-Know” disclosures.<sup>14</sup>

Such disclosures are important because, as we document in this Article, disclosure statistically significantly alters the willingness of workers to participate in cleanup efforts.<sup>15</sup> That is to say, workers find the facts included in the disclosure important to their decision-making process. To document this, we utilize an experimental setting that incorporates a material safety data sheet (MSDS) distributed by a manufacturer of a chemical dispersant used in a hypothetical large oil spill cleanup effort.<sup>16</sup> As a further experimental treatment, we provide a series of anecdotes, framed as coming from a (non-existent) government-run website that allows individuals involved in current or former cleanup efforts to detail their experiences with those efforts and

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10. See, e.g., Robert A. Stallings, *Volunteerism Inside Complex Organizations: Off-Duty Hospital Personnel in a Disaster*, 18 *NONPROFIT & VOLUNTARY SECTOR Q.* 133, 133 (1989).

11. See D’Andrea & Reddy, *supra* note 8, at 966 (discussing Gulf of Mexico cleanup and resulting illness); see also Kim Murphy, *Exxon Oil Spill’s Cleanup Crews Share Years of Illness*; *Health*, L.A. TIMES (Nov. 5, 2001), <https://www.latimes.com/archives/la-xpm-2001-nov-05-mn-372-story.html> [<https://perma.cc/5E7P-9JCK>] (discussing Exxon Valdez cleanup and resulting illness); Susan Q. Stranahan, *The Valdez Crud*, MOTHER JONES (Mar.-Apr. 2003), <https://www.motherjones.com/politics/2003/03/valdez-crud> [<https://perma.cc/5PCY-MD6P>] (same).

12. Leslie Kaufman & Elisabeth Rosenthal, *Worry About Dispersant Rises as Men in Work Crew Complain of Health Problems*, N.Y. TIMES (May 28, 2010), <https://www.nytimes.com/2010/05/28/science/earth/28workers.html> [<https://perma.cc/AL38-VV26>] (“‘They say we don’t need respirators,’ said [a cleanup worker], shaking his head. ‘I don’t know.’”).

13. See *infra* Sections II.A, II.B.

14. See *infra* Section II.C.

15. See *infra* Part V.

16. The MSDS used is for Corexit, a chemical dispersant applied after the Gulf Oil Spill to disperse oil before it could make it to shore. See *Safety Data Sheet: Corexit® EC9527A*, NALCO (May 11, 2010), [https://www.restorethegulf.gov/sites/default/files/imported\\_pdfs/external/content/document/2931/539295/1/Corexit%20EC9527A%20MSDS.pdf](https://www.restorethegulf.gov/sites/default/files/imported_pdfs/external/content/document/2931/539295/1/Corexit%20EC9527A%20MSDS.pdf) [<https://perma.cc/Y97W-6RHQ>] [hereinafter Corexit MSDS]. This experimental treatment is not intended to be an exhaustive examination of every MSDS distributed, but merely intended to gauge whether this particular MSDS would have had material impact on the expressed propensity to engage in cleanup efforts.

with any “Later-Manifested Physical Conditions” (LMPC).<sup>17</sup> These anecdotes describe various degrees of exposure to oil, chemicals, or both that workers might encounter during the cleanup, or they describe health conditions that former or current cleanup workers attribute to that exposure.<sup>18</sup>

As will be set forth in greater detail below, the findings of the experiment (and corresponding recommendations) are as follows:

**Finding 1.** The willingness of an individual to act as an oil cleanup worker (either employee or volunteer) fell significantly after reviewing the MSDS.<sup>19</sup>

**Recommendation 1.** *Lawmakers should facilitate the disclosure of hazards in the form of the MSDS by harmonizing the broad patchwork of rules.*<sup>20</sup>

**Finding 2.** The willingness of an individual to act as an oil cleanup worker (either employee or volunteer) fell even more significantly after reviewing anecdotes of both worksite exposure to oil/dispersants and LMPC experienced by workers in prior oil spill cleanup efforts.<sup>21</sup>

**Recommendation 2.** *Lawmakers should incorporate personal anecdotes by former cleanup workers into the information provided in the MSDS (or instructions on how workers can access such personal anecdotes via a government-run website).*<sup>22</sup>

This Article will proceed as follows: Part I details the increase in oil production and transport in the United States and the resulting oil spills. These spills catalyze worker (both employee and volunteer) efforts to mitigate the potential damage of the spill but entail potential exposure to chemicals that may present a health risk to those involved in cleanup efforts. These health risks are described in some detail.

Part II describes the patchwork of laws requiring that oil spill cleanup workers be provided with disclosure of those health risks in the form of the MSDS (including the OSH Act, OSHA-approved state plans, OSHA HAZWAPER, EPA HAZWAPER, and the EPCRA). However, any patchwork of laws inevitably leaves gaps in coverage, and this case is no different. Therefore, Part II concludes that lawmakers should harmonize the laws to facilitate the disclosure of risk to both employees and volunteers. The

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17. “Later-Manifested Physical Condition” is defined in the Medical Benefits Settlement Agreement as “a physical condition that is first diagnosed in a Medical Benefits Settlement Class Member after April 16, 2012, and which is claimed to have resulted from [their] exposure to oil, other hydrocarbons, or other substances released from the MC252 WELL and/or the Deepwater Horizon and its appurtenances, and/or exposure to dispersants and/or decontaminants used in connection with the Response Activities...” *Deepwater Horizon* Medical Benefits Class Action Settlement Agreement § II (¶ VV), *In re* Oil Spill by the Oil Rig “Deepwater Horizon” in the Gulf of Mexico, on Apr. 20, 2010, No. 2:10-md-02179-CJB-SS (E.D. La. May 3, 2012), ECF No. 6427-1, <https://deepwaterhorizonmedicalsettlement.com/Portals/23/DWHDdocuments/MedicalBenefitsSettlementAgreementwithoutexhibitsFiled20120503.pdf> [<https://perma.cc/6HCV-Z56Q>].

18. *See infra* Appendix B.

19. *See infra* Sections V.B, V.C, V.D.

20. *See infra* Section II.D.

21. *See infra* Part V.

22. *See infra* Part VI.

importance of doing so will come into even greater focus when we discuss our empirical findings that an individual's willingness to act as an oil cleanup worker (either employee or volunteer) fell significantly after reviewing the MSDS. That is to say, workers find the facts included in the MSDS important to their decision-making process.

Part III describes the Hazard Communication Regulation requirements for the contents of MSDS, then argues that more is needed—in the form of anecdotes of both working conditions and LMPC—by drawing an analogy to disclosure under the Securities Laws. This argument is further supported by our empirical findings later in Part V.

Part IV discusses our empirical methods, and Part V presents the results of our experiment. We find that how the information is disclosed to the subjects alters their assessment of the risk of participating in cleanup efforts, willingness to participate, willingness to volunteer, willingness to work as an employee, and finally, the wages they demand for that work as an employee.

Part VI discusses the implications of our findings. We suggest that there might be value in a federal agency—such as OSHA or the EPA—constructing a website that would allow individuals involved in current or former cleanup efforts to detail their experiences with those efforts and with any LMPC. This policy proposal is anchored in the premise that such a website could be construed as a reasonable mechanism for helping individuals to become more fully informed regarding the potential risks of participating in oil cleanup efforts or at least bargain for compensation commensurate with the potential health risks involved. Part VI also discusses one possible counterargument to our proposal: that increasing disclosure will lead to the undesirable outcome of fewer persons volunteering to be oil cleanup workers. After addressing that concern—and concluding that the likely medium- to long-term outcome is increased trust and increased willingness to serve as an oil spill cleanup worker—we conclude.

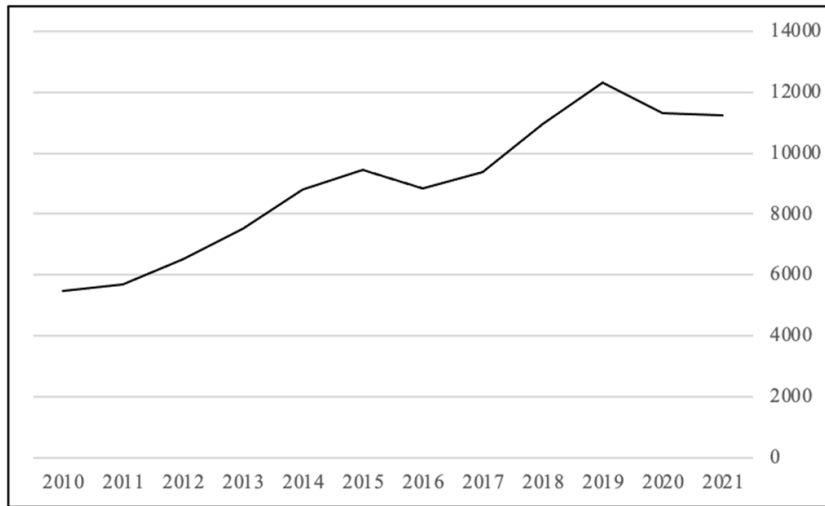
## I. OIL PRODUCTION, TRANSPORTATION AND SPILLS

### *A. Oil Production and Transportation*

According to the U.S. Energy Information Administration, the United States produced over 11.25 million barrels of crude oil per day in 2021.<sup>23</sup> As illustrated in the chart below, this is a significant increase in just the past ten years.

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23. *U.S. Field Production of Crude Oil*, U.S. ENERGY INFO. ADMIN., <https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pets&s=mcrfpus2&f=a> [https://perma.cc/FF69-AKT6] (last visited Nov. 13, 2022) [hereinafter *Production of Crude*].

Figure 1: U.S. Field Production of Crude Oil (1,000 barrels/day)<sup>24</sup>

About fifteen percent of that crude oil production takes place offshore, primarily in the Gulf of Mexico.<sup>25</sup> The wells are drilled from oil platforms that can float or be fixed on the ocean floor.<sup>26</sup> The oil platforms are huge, with storage for up to one million barrels of oil and housing for up to 200 persons.<sup>27</sup>

Oil platform drilling can take place in waters up to two miles deep.<sup>28</sup> However, most of the thousands of wells in the Gulf of Mexico—including the ill-fated Deepwater Horizon—operate in waters approximately one mile deep.<sup>29</sup> While offshore oil wells account for only fifteen percent of production, the Deepwater Horizon incident illustrates the increased potential of such wells to cause environmental harm.

The remaining eighty-five percent of oil production takes place in the interior of the United States via drilling rigs.<sup>30</sup> Of course, all of that oil needs to be transported. Hundreds of millions of barrels of crude oil and petroleum

24. *Id.* (For data used to construct Figure 1, select “data” on drop down menu “Download Data (XLS File)”).

25. *Oil and Petroleum Products Explained: Offshore Oil and Gas*, U.S. ENERGY INFO. ADMIN., <https://www.eia.gov/energyexplained/oil-and-petroleum-products/offshore-oil-and-gas-in-depth.php> [<https://perma.cc/A4F6-N2SP>] (last visited June 16, 2023) [hereinafter *Products Explained*].

26. *Id.*

27. *Id.*

28. *Id.*

29. *Id.* The Deepwater Horizon was operating in waters 4,132 feet (0.78 miles) deep.

30. *Id.*



products are moved by pipeline, tanker, barge, and rail between the various production regions of the United States every month.<sup>31</sup>

One trend in this interior movement is increased dependence on rail transport. Between 2010 and 2021, transportation of crude oil and petroleum products by rail car increased significantly from 262 million barrels to 392 million barrels per year (with some interim years reaching greater than 550 million barrels).<sup>32</sup>

Further, in the past twenty years, the amount of oil exported by the United States (principally from the Gulf Coast ports of Houston, Corpus Christi, and Beaumont) increased from one million barrels per day to almost ten million barrels per day.<sup>33</sup>

### B. Oil Spills

Thousands of oil spills occur in the United States every year.<sup>34</sup> Still, according to the Congressional Research Service, the total volume of oil spilled in the United States has shrunk dramatically over the past forty years.<sup>35</sup> Between 1974 and 2016, the volume of crude oil spilled fell from over fifteen million barrels to less than one million barrels.<sup>36</sup> Much of the decrease occurred in the 1990s. The Congressional Research Service attributes the decline in oil spills to the passage of the Oil Pollution Act of 1990 (OPA) in response to the Exxon Valdez oil spill in Alaska.<sup>37</sup> OPA implemented increased safety standards and pecuniary liability for violators.<sup>38</sup>

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31. *Table 57, Movements of Crude Oil and Petroleum Products by Pipeline, Tanker, Barge and Rail Between PAD Districts, U.S. ENERGY INFO. ADMIN.*, <https://www.eia.gov/petroleum/supply/monthly/pdf/table57.pdf> [<https://perma.cc/WQ2U-G48X>] (last visited Jan. 10, 2023); *see also Movements by Pipeline, Tanker, Barge and Rail Between PAD Districts, U.S. ENERGY INFO. ADMIN.*, [https://www.eia.gov/dnav/pet/pet\\_move\\_ptb\\_dc\\_R20-R10\\_mbb1\\_m.htm](https://www.eia.gov/dnav/pet/pet_move_ptb_dc_R20-R10_mbb1_m.htm) [<https://perma.cc/UF69-9BUQ>] (last visited Nov. 6, 2023) (showing multiple months of data).

32. *Crude Oil and Petroleum Products Transported in the United States by Mode*, BUREAU OF TRANSP. STAT., <https://www.bts.gov/content/crude-oil-and-petroleum-products-transported-united-states-mode> [<https://perma.cc/9GAX-CS66>] (last visited Jan. 10, 2023).

33. *Production of Crude*, *supra* note 23.

34. *Largest Oil Spills Affecting U.S. Waters Since 1969*, NOAA OFF. OF RESPONSE & RESTORATION, <https://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/largest-oil-spills-affecting-us-waters-1969.html> [<https://perma.cc/V9AQ-LWPE>] (last visited Jan. 10, 2023).

35. JONATHAN L. RAMSEUR, CONG. RSCH. SERV., RL33705, OIL SPILLS: BACKGROUND AND GOVERNANCE 3-4 (2017), <https://crsreports.congress.gov/product/pdf/RL/RL33705> [<https://perma.cc/ZEP5-RHXV>] [hereinafter OIL SPILLS BACKGROUND]; *see* DAGMAR SCHMIDT ETKIN, AM. PETROL. INST., ANALYSIS OF U.S. OIL SPILLAGE 2 (2009), [http://www.api.org/environment-health-and-safety/clean-water/oil-spill-prevention-and-response/~/\\_media/93371edfb94c4b4d9c6bbc766f0c4a40.ashx](http://www.api.org/environment-health-and-safety/clean-water/oil-spill-prevention-and-response/~/_media/93371edfb94c4b4d9c6bbc766f0c4a40.ashx) [<https://perma.cc/24VS-HSK3>] (describing decrease in oil spillage).

36. OIL SPILLS BACKGROUND, *supra* note 35, at 4.

37. *Id.* at 3-4.

38. Michael J. McHale, *An Introduction to Offshore Energy Exploration—A Florida Perspective*, 39 J. MAR. L. & COM. 571, 585 (2008).

Despite these strides in safety and efficiency, extreme spills are still possible, as the 2010 Gulf Oil Spill demonstrated. Before that particular spill had been stopped, an estimated 207 million gallons (roughly five million barrels) had flowed into the Gulf of Mexico.<sup>39</sup>

Further, each transportation route discussed above (whether oil tanker, pipeline, or rail) poses a danger. By way of example, in 1989, the oil tanker Exxon Valdez, which had just left the port of Valdez, Alaska, struck a reef and spilled eleven million gallons of crude oil into Prince William Sound.<sup>40</sup> Residents and volunteers rushed to clean up the spill.<sup>41</sup> At the time, oil cleanup workers complained of headaches, nausea, chemical burns, and breathing problems.<sup>42</sup> Years later, some claimed they developed lung cancer.<sup>43</sup>

Turning to interior transportation, in 2015, a train carrying crude oil derailed near Mount Carbon, West Virginia.<sup>44</sup> Thousands of gallons of crude oil spilled onto the ground and into the Kanawha River.<sup>45</sup> Residents that engaged in the cleanup claimed harms similar to those experienced by Exxon Valdez cleanup workers.<sup>46</sup> As the Exxon Valdez and Mount Carbon incidents show, despite overall improvements in safety, oil spills and their cleanups pose serious health risks to workers.

### C. Harm to Cleanup Employees and Volunteers

Oil spills pose health dangers to cleanup workers due to both the crude oil itself and the chemical dispersants generally used in such incidents. The short-term risks of exposure to crude oil include skin and eye irritation and respiratory issues.<sup>47</sup> Longer-term health risks include genetic defects, cancer, fertility and natal risks, and organ damage.<sup>48</sup>

Corexit was the primary dispersant used during the cleanup of the Gulf Oil Spill.<sup>49</sup> Corexit works by “break[ing] down the oil into smaller droplets, which is intended to increase the surface area of the mass and disperse oil

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39. Evan Applegate, *25 Years of Oil Spills*, BLOOM. BUS. WK. (Mar. 13, 2014, 5:01 PM), <https://www.bloomberg.news/articles/2014-03-13/25-years-of-oil-spills> [<https://perma.cc/4ABH-JDR4>].

40. *In re Exxon Valdez*, 270 F.3d 1215, 1223 (9th Cir. 2001).

41. *See* Murphy, *supra* note 11.

42. *Id.*

43. *See id.*

44. Jack Hueter, *Exploding Trains in the Wake of the Crude-By-Rail Boom: The Distribution of Liability in Crude-Train Derailments*, 2016 WIS. L. REV. 1033, 1037 (2016).

45. *Sigman v. CSX Corp.*, 2016 U.S. Dist. LEXIS 60718, at \*62 (S.D. W. Va. May 5, 2016).

46. *Id.* at \*65.

47. *See* British Petroleum, Material Safety Data Sheet: Product Crude Oil, RS296, 2 (2003), <https://oilspill.fsu.edu/images/pdfs/msds-crude-oil.pdf> [<https://perma.cc/9F3U-8M52>] [hereinafter Crude Oil MSDS].

48. *In re Oil Spill*, 295 F.R.D. 112, 121 (E.D. La. 2013).

49. *Id.* at 128.

into the water column (as opposed to allowing it to remain on the surface), increasing the oil's susceptibility to biodegradation."<sup>50</sup> Unfortunately, Corexit can cause respiratory, dermal, and ocular irritation, and even kidney and liver damage.<sup>51</sup>

In the aftermath of the Gulf Oil Spill, many cleanup workers brought lawsuits seeking compensation for personal injuries and medical monitoring.<sup>52</sup> They had mixed results. Consider the case of Blaine McGill.<sup>53</sup> As explained by the district court, in the summer of 2010, McGill was employed to clean up oil from the Deepwater Horizon.<sup>54</sup> He was part of a boat crew tasked with containing oil at sea using floating boom barriers and then scooping the oil into garbage bags on the boat.<sup>55</sup> He was part of a 2013 settlement with BP that provided compensation for various respiratory, dermal, and ocular conditions tied to exposure to oil or dispersants.<sup>56</sup> The settlement also provided for a Back-End Litigation Option (BELO) for those alleging that exposure to oil and dispersants led to LMPC.<sup>57</sup> In 2017, McGill took advantage of this option and filed a BELO lawsuit after he was diagnosed with numerous illnesses, including pneumonia and acute respiratory failure.<sup>58</sup>

BP moved to dismiss the action in the district court, arguing that McGill could not establish that his exposure to the oil or dispersants legally caused his illness.<sup>59</sup> The court granted BP's motion, finding that McGill could not establish his level of exposure to oil or Corexit, or the level of oil or Corexit exposure that would cause harm to humans.<sup>60</sup> The Fifth Circuit affirmed.<sup>61</sup>

On the other hand, a different BELO plaintiff had better luck. John Maas worked as a cleanup worker and boat captain in the aftermath of the Gulf Oil Spill.<sup>62</sup> Like McGill, he was a part of the 2013 settlement, and like McGill, he brought a BELO lawsuit claiming an LMPC.<sup>63</sup> Specifically, he filed a lawsuit on January 29, 2020, alleging that he developed asthma and reactive

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50. *Id.*

51. Corexit MSDS, *supra* note 16, at 1.

52. *In re Oil Spill*, 295 F.R.D. at 118.

53. McGill v. BP Expl. & Prod. Inc., No. 1:18CV159-LG-RHW, 2019 U.S. Dist. LEXIS 198359 (S.D. Miss. Nov. 15, 2019), *aff'd*, McGill v. BP Expl. & Prod., Inc., 830 F. App'x 430 (5th Cir. 2020).

54. *Id.* at \*2.

55. *Id.*

56. *Id.* Regarding the approval of the settlement itself, see *In re Oil Spill*, 295 F.R.D. at 120 (approving the settlement).

57. McGill, 2019 U.S. Dist. LEXIS 198359, at \*2.

58. *Id.*

59. *Id.* at \*4, \*11.

60. *Id.* at \*11.

61. McGill, 830 F. App'x at 431.

62. Maas v. BP Expl. & Prod., Inc., 576 F. Supp. 3d 564, 567 (M.D. Tenn. 2021).

63. *Id.* at 566-67.

airways disease due to his exposure to Corexit.<sup>64</sup> As it had in the McGill lawsuit, BP moved for dismissal, claiming that Maas could not show a causal link between his exposure to oil and Corexit and his health conditions.<sup>65</sup> Here, the court refused to dismiss the case.<sup>66</sup> The difference between the outcomes in *McGill* and *Maas* can likely be attributed to Maas's ability to allege with more particularity his level of exposure ("twelve (12) hours per day for two (2) months") and a diagnosis that first ruled out other possible causes of his illness.<sup>67</sup>

*McGill* and *Maas* demonstrate the serious LMPCs the oil spill cleanup workers experience and those workers' varying levels of success in receiving compensation for these harms. But, of course, it would be better if exposure to dangerous chemicals did not occur in the first place. Therefore, we now turn to prophylactic laws intended to protect oil spill cleanup workers—specifically, laws requiring disclosure of hazardous chemicals to which workers may be exposed in the course of their work.

## II. THE PATCHWORK OF LAWS REQUIRING DISCLOSURE TO OIL SPILL CLEANUP WORKERS

Congress has passed numerous pieces of legislation to protect individuals from exposure to hazardous chemical substances, including those that workers might encounter during the cleanup of an oil spill. This Article focuses on provisions within those laws that require disclosure through MSDS to both employees and volunteers. That is to say, we focus on provisions that provide oil spill cleanup workers with the necessary information to protect themselves.

Complicating any analysis is that the disclosure requirements appear in a patchwork of statutes and regulations. There is competition between federal and state governments and competition between various agencies (e.g., OSHA and EPA) within each level of government.

### *A. The Occupational Safety and Health Act (OSH Act) Hazard Communication Regulation*

#### *1. Application to Employees*

The starting point for any discussion of MSDSs is the OSH Act of 1970.<sup>68</sup> The OSH Act tasked the Secretary of Labor with protecting employee

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64. *Id.* at 567.

65. *Id.* at 566.

66. *Id.* at 570-71.

67. *Id.* at 570.

68. Occupational Safety and Health Act of 1970, Pub. L. No. 91-596, §§ 29-30, 84 Stat. 1590, 1618-19 (1970) (codified as amended at 29 U.S.C. § 553, 5 U.S.C. § 5315, and 5 U.S.C. § 5108).

safety and health.<sup>69</sup> That task was, in turn, delegated to the Assistant Secretary of Labor for Occupational Safety and Health, creating OSHA.<sup>70</sup> One way that OSHA acted to protect employee safety and health was by promulgating the Hazard Communication Regulation.<sup>71</sup> It requires that employers implement a hazard communication program, whereby the employer classifies the hazards of all chemicals with which an employee may come in contact and communicates that information to employees through container labeling and other forms of warning, such as the MSDS.<sup>72</sup>

The MSDS is a multi-page document that the chemical manufacturer is required to provide to downstream users for each hazardous chemical it manufactures.<sup>73</sup> In turn, employers must make sure that each applicable MSDS is readily available to employees in binder or electronic form.<sup>74</sup> Each MSDS must contain the name of the hazardous chemical, safety precautions that should be taken, and toxicity information (including a description of the delayed, immediate, or chronic effects from short- and long-term exposure).<sup>75</sup> Importantly, the regulation covers both chemicals that workers must use on a day-to-day basis and chemicals that workers would use to respond to a foreseeable emergency (such as Corexit).<sup>76</sup>

Failure of an employer to make available the appropriate MSDS means that “employees will not know what safety precautions to take when working with a specific hazardous chemical, or what emergency measures to take in the event of an injury or condition caused by a hazardous chemical.”<sup>77</sup> Such a failure can result in significant monetary fines for the employer.<sup>78</sup>

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69. For a detailed discussion of the history of OSHA, see RODNEY M. PERRY, CONG. RSCH. SERV., R43768, *THE OSH ACT: A LEGAL OVERVIEW* (2014).

70. Delegation of Authority and Assignment of Responsibility to the Assistant Secretary for Occupational Safety and Health, 77 Fed. Reg. 3912, 3912 (Jan. 25, 2012).

71. 29 C.F.R. § 1910.1200 et seq. (2019).

72. *Id.* § 1910.1200(a)(1). This regulation was promulgated under the Secretary’s broad authority to promulgate any occupational safety or health standard. 29 U.S.C. § 655(a). In turn, “‘occupational safety and health standard’ means a standard which requires conditions, or the adoption or use of one or more practices, means, methods, operations, or processes, reasonably necessary or appropriate to provide safe or healthful employment and places of employment.” 29 C.F.R. § 652(8). For an in-depth discussion, see John J. Manna, Jr., *The Extent of OSHA Preemption of State Hazard Reporting Requirements*, 88 COLUM. L. REV. 630, 631 (1988).

73. 29 C.F.R. § 1910.1200(g)(1); see Hazard Communication Standard, 86 Fed. Reg. 9576, 9577, 9688 (proposed Feb. 16, 2021) (codified at 29 C.F.R. § 1910).

74. 29 C.F.R. § 1910.1200(g)(8); see OCCUPATIONAL SAFETY & HEALTH ADMIN., GUIDANCE FOR INTERPRETING SAFETY DATA SHEETS 7, <https://www.osha.gov/sites/default/files/publications/OSHA3514.pdf> [<https://perma.cc/4PPE-JZM8>] (explaining acceptable modes of communication).

75. 29 C.F.R. § 1910.1200(g)(2); 29 C.F.R. § 1910.1200 app. D.

76. See *id.* § 1910.1200(c).

77. Joel Patterson Air Conditioning Recycling, 2002 OSHARC LEXIS 53, at \*13 (No. 02-0051, 2002) (ALJ) (affirming OSHA’s assessment of fine for failure to provide the MSDS).

78. 29 U.S.C. § 666.

## 2. Application to Volunteers

While there is no question that applicable laws require employers to provide each relevant MSDS to their employees, a more difficult question is whether they must also provide them to volunteers. The issue arises because volunteers are not compensated and are thus not considered employees by OSHA.<sup>79</sup>

This issue arose in the context of a Standard Interpretation<sup>80</sup> from OSHA to Adventist Disaster Response (ADR) (while the Standard Interpretation does not address providing the MSDS to volunteers, the reasoning regarding application of OSHA to volunteers is pertinent).<sup>81</sup> ADR runs disaster response warehouses where volunteers operate forklifts to move pallets containing everything from water to clothing.<sup>82</sup> ADR did not know whether it was required to follow OSHA's training requirements for forklift operators.<sup>83</sup> It sent a letter asking whether "OSHA regulations using the word 'employee' also apply to volunteers?"<sup>84</sup> OSHA began its response by stating, "if . . . your warehouse staff are volunteers who receive no monetary or other compensation, it is OSHA's view that they are not employees subject to coverage under the federal OSH Act."<sup>85</sup> However, OSHA continued by writing that it "encourage[s] [ADR] to ensure that [its] volunteers receive the training outlined in OSHA's standard before operating forklifts."<sup>86</sup>

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79. The OSH Act defines "employee" as one "employed in a business of his employer which affects commerce." *Id.* § 652(6). That does not cover uncompensated volunteers. See Letter from Patricia Clark, Dir., Directorate of Compliance Programs to Robert T. Turner (Feb. 12, 1992), <https://www.osha.gov/laws-regs/standardinterpretations/1992-02-12> [<https://perma.cc/79L8-282Y>] ("Federal OSHA does not generally cover volunteers, unless they are compensated in some way and would therefore be considered employees."); Letter from Richard E. Fairfax, Dir., Directorate of Enforcement Programs to Mr. Steve Stillwell, Assistant to the Dir., Adventist Disaster Response (May 13, 2005), <https://www.osha.gov/laws-regs/standardinterpretations/2005-05-13> [<https://perma.cc/CHN2-RYPY>] [hereinafter ADR Standard Interpretation Letter] (stating same). On the other hand, if the volunteer did receive some form of compensation, the volunteer may be considered an employee under the OSH Act. 8 Labor and Employment Law § 186.08 (2022).

80. According to OSHA, "Standard Interpretations are letters or memos written in response to public inquiries or field office inquiries regarding how some aspect of or terminology in an OSHA standard or regulation is to be interpreted and enforced by the Agency. These letters provide guidance to clarify the application of an established OSHA standard, policy, or procedure, but they may not, in themselves, establish or revise OSHA policy or procedure or interpret the OSH Act." *Standard Interpretations*, OCCUPATIONAL SAFETY & HEALTH ADMIN. (2023), <https://www.osha.gov/laws-regs/standardinterpretations/publicationdate/currentyear> [<https://perma.cc/K5ZH-4D7G>].

81. See ADR Standard Interpretation Letter, *supra* note 79.

82. Erin Anderson, *Donors Help Meet Hallam's Needs*, LINCOLN J. STAR (May 25, 2004), [https://journalstar.com/news/local/donors-help-meet-hallams-needs/article\\_e1d6da7a-acd6-52fc-a564-aaad4908df64.html](https://journalstar.com/news/local/donors-help-meet-hallams-needs/article_e1d6da7a-acd6-52fc-a564-aaad4908df64.html) [<https://perma.cc/324G-SY4C>].

83. ADR Standard Interpretation Letter, *supra* note 79.

84. *Id.*

85. *Id.*

86. *Id.*

OSHA was also quick to point out that many localities operate under OSHA-Approved State Plans that “extend coverage to certain volunteers and other workers exempt from Federal OSHA authority.”<sup>87</sup> States can implement their own OSHA regulations, as long as they are no less stringent than federal OSHA.<sup>88</sup> Whether volunteers are covered by OSHA-Approved State Plans must be determined on a state-by-state basis.

### *B. The Application of the OSH Act’s Hazard Communication Regulation to Oil Spills*

When an oil spill occurs, workers rush to mitigate the potential damage of the spill, either as formal incident cleanup employees or as volunteers. They will inevitably come into contact with hazardous chemicals—including crude oil, oil byproducts, and dispersants—and, under the OSH Act, should be provided with the MSDS for each.<sup>89</sup>

OSHA’s Hazard Communication Regulation and the requirement that workers be provided with MSDS applies to oil spill cleanup workers through the OSH Act’s interplay with several other statutory and regulatory regimes. At the risk of oversimplification:

- An oil spill triggers the National Oil and Hazardous Substance Pollution Contingency Plan (NCP),<sup>90</sup>
- The NCP triggers either (1) OSHA’s Hazardous Waste Operations and Emergency Response (HAZWOPER)<sup>91</sup> or (2) EPA’s HAZWOPER;<sup>92</sup>
- Both OSHA’s HAZWOPER and EPA’s HAZWOPER incorporate by reference OSHA’s Hazard Communication Regulation;<sup>93</sup> and

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87. *Id.*

88. 29 U.S.C. § 667 (allowing states to submit their own plan for approval).

89. NAT’L CLEARINGHOUSE FOR WORKER SAFETY AND HEALTH TRAINING, NAT’L INST. OF ENV’T HEALTH SCI., SAFETY AND HEALTH AWARENESS FOR OIL SPILL CLEANUP WORKERS 17 (2010), [https://www.osha.gov/sites/default/files/publications/Oil\\_Spill\\_Booklet\\_05-11\\_v4.pdf](https://www.osha.gov/sites/default/files/publications/Oil_Spill_Booklet_05-11_v4.pdf) [<https://perma.cc/324G-SY4C>].

90. See Occupational Safety & Health Admin., U.S. Dep’t of Labor, Training Marine Oil Spill Response Workers Under OSHA’s Hazardous Waste Operations and Emergency Response Standard (2001), <https://www.osha.gov/publications/3172> [<https://perma.cc/6EWN-DCM8>] (“Marine oil spill response is organized and managed according to the regulations found in 40 C.F.R. § 300, the National Oil and Hazardous Substance Pollution Contingency Plan.”).

91. 40 C.F.R. § 300.150(a) (“Response actions under the NCP will comply with the provisions for response action worker safety and health in 29 CFR 1910.120.”).

92. EPA HAZWOPER applies where the incident occurs in a state without an OSHA-Approved State Plan. Patricia Clark, *Hazwoper EPA and OSHA Jurisdictional Issues* (Dec. 18, 1991), <https://www.osha.gov/laws-regs/standardinterpretations/1991-12-18-0> [<https://perma.cc/CZ44-K3VV>] (citing 40 C.F.R. § 311).

93. 29 C.F.R. § 1910.120(p)(2) (“The employer shall implement a hazard communication program meeting the requirements of 29 CFR §1910.1200 as part of the employer’s safety program.”).

- OSHA’s Hazard Communication Regulation requires that workers (employees in the case of OSHA’s HAZWOPER, and employees and some volunteers in the case of EPA’s HAZWOPER<sup>94</sup>) be provided with the MSDS for each hazardous chemical they may contact.<sup>95</sup>

In other words, employees engaged in cleanup activities would be covered under OSHA HAZWOPER.<sup>96</sup> As to volunteers engaged in cleanup activities, “[they] come under the regulatory coverage of state-level OSHA regulation or EPA HAZWOPER regulation.”<sup>97</sup>

Indeed, at the time of the Gulf Oil Spill, news stories indicated that workers did have access to the MSDS for each hazardous chemical they may have contacted.<sup>98</sup> However, at the same time, experts questioned the adequacy of the information provided.<sup>99</sup> Some experts complained that MSDSs were confusing, especially for lay cleanup workers.<sup>100</sup> One OSHA official said that MSDSs “were confusing and left out too much important information to be of any use to workers.”<sup>101</sup> The official continued, “[t]he employee is supposed to be able to learn about the harm.”<sup>102</sup>

Those shortcomings still persist today. Given those shortcomings, expanding the depth of disclosure to include personal anecdotes—as recommended in Part III of this Article and supported by empirical findings in Part V—would be additively helpful.

94. EPA HAZWOPER is identical to OSHA HAZWOPER, with the exception that it extends the definition of employee to include “a compensated or *non-compensated* worker who is controlled directly by a State or local government, as contrasted to an independent contractor.” See 40 C.F.R. § 311.2 (emphasis added).

95. 29 C.F.R. § 1910.1200(g).

96. See Hari M. Osofsky, Kate Baxter-Kauf, Bradley Hammer, Ann Mailander & Brett Mares, *Environmental Justice and the BP Deepwater Horizon Oil Spill*, 20 N.Y.U. ENV’T L.J. 99, 178 (2012) (providing an explanation of the incorporation of OSHA requirements into the NCP).

97. Osofsky et al, *supra* note 96, at 178. While Osofsky, Baxter-Kauf, Hammer, Mailander and Mares were talking about training of cleanup workers, the logic applies equally well to providing MSDS. *Id.* Indeed, cleanup workers could not be trained without learning about MSDS, and especially Section 6, Accidental Release Measures. See Crude Oil MSDS, *supra* note 47, at 4.

98. Marisa Taylor, *Health Officials Examine Risks to Oil Leak Workers*, CHARLESTON GAZETTE, Aug. 7, 2010, at P9C; Elana Schor, *Ingredients of Controversial Dispersants Used on Gulf Spill Are Secrets No More*, N.Y. TIMES (June 9, 2010), <https://archive.nytimes.com/www.nytimes.com/gwire/2010/06/09/09greenwire-ingredients-of-controversial-dispersants-used-42891.html> [<https://perma.cc/QL2E-V2P9>]. These MSDS included those for Crude Oil itself, see Crude Oil MSDS, *supra* note 47, as well as for the chemical dispersant Corexit. See Corexit MSDS, *supra* note 16.

99. Taylor, *supra* note 98, at P9C; Schor, *supra* note 98.

100. Taylor, *supra* note 98, at P9C.

101. *Id.*

102. *Id.*



### C. The Emergency Planning and Community Right-to-Know Act (EPCRA)

The Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) is a mechanism for informing the broader community of the presence of potentially harmful materials.<sup>103</sup> It is important for our purposes because it extends the OSH Act’s Hazard Communication Regulation, traditionally focused on protecting employees, outward to protect the broader community as well.<sup>104</sup>

Under the EPCRA, any facility that is required to make MSDSs available to employees must also send them to the local emergency planning committee, the State emergency response commission, and the local fire department.<sup>105</sup> Further, the public must be able to access these documents with a written request.<sup>106</sup> This public access—and the provision of MSDS—would certainly be important where community members are called upon to volunteer to assist with an oil spill cleanup. The MSDS would empower those potential volunteers to gauge the risks of participating in the cleanup.

Table 1: Patchwork of Regulatory Regimes

<b>Regulatory Regime</b>	<b>Requires that the MSDS be available to employees?</b>	<b>Requires that the MSDS be available to volunteers?</b>	<b>Applicable statutory or regulatory section</b>
OSH Act	Yes	No	29 C.F.R. § 1910.1200
OSHA-Approved State Plan	Yes	Must be determined on a state-by-state basis	29 U.S.C. § 667 (allowing for state plans)
OSHA HAZWOPER	Yes	No	29 C.F.R. § 1910.120
EPA HAZWOPER	Yes	Extends to volunteers controlled by state or local government	40 C.F.R. § 311.1

103. 42 U.S.C. § 11021 *et seq.*; see EPA, EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT (EPCRA), <http://www.epa.gov/epcra> [<https://perma.cc/MAJ2-8RY7>] (last visited on Aug. 31, 2022).

104. *Don’t Waste Ariz., Inc. v. McLane Foods, Inc.*, 950 F.Supp. 972, 979 (D. Ariz. 1997) (“The purpose of the EPCRA reporting requirements is to provide citizens with information about environmental hazards in their communities and to allow emergency response agencies to plan for potential environmental emergencies.”).

105. 42 U.S.C. § 11021(a)(1).

106. 42 U.S.C. § 11021(c)(2).

EPCRA	No	Yes, because volunteers are members of the broader public	42 U.S.C. § 11021
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#### D. Conclusions

From the above-described patchwork of rules, one can deduce that Congress and regulatory agencies, such as OSHA and EPA, intend workers to have access to information about the hazardous chemicals that they may contact. That information is provided in the form of an MSDS.

For now, it suffices to say that the patchwork nature of the rules raises the specter of many oil spill workers not receiving appropriate disclosure. Therefore, we conclude that the relevant agencies—and, if necessary, Congress—should engage in a concerted effort to harmonize those statutes and rules to (1) make clear that the Hazard Communication Regulation applies to both employees and volunteers and (2) clearly designate who is responsible for enforcement (OSHA or EPA).

### III. DISCLOSURE: BREADTH AND DEPTH

Disclosure laws are prophylactic. That is, they prevent harm from occurring in the first instance by warning the person *before* they face the risk. Prophylactic laws can be juxtaposed against remedial laws, which aim to compensate the worker *after* they have been injured, as is the case for BELO lawsuits claiming LMPCs.<sup>107</sup>

Providing the MSDS for each hazardous chemical a worker may contact is prophylactic: the MSDS warns the worker before they are exposed to a hazardous chemical.<sup>108</sup> The worker may decide the risk is acceptable. Alternatively, the worker may decide the risk is too great and resign (or, for a non-compensated worker, not volunteer).

In this Part, we will focus on the breadth and depth of disclosure in the MSDS. Breadth refers to which hazards must be disclosed. Depth refers to, as the name suggests, how deep the disclosure should go. When discussing the depth of disclosure, we are interested in whether the Hazard Communication Regulation would allow for anecdotes about the impact of a particular health hazard.

Unfortunately, the Hazard Communication Regulation is not clear on this front. Therefore, we use an analogy to the Securities Laws to support the

107. See *supra* Part I.C.

108. Susan Harthill, *The Need for a Revitalized Regulatory Scheme to Address Workplace Bullying in the United States: Harnessing the Federal Occupational Safety and Health Act*, 78 U. CIN. L. REV. 1250, 1298 (2010) (“OSHA generally, and the general duty clause specifically, is a prophylactic law meant to prevent and deter occupational safety and health hazards.”).

normative position that the Hazard Communication regulation should allow—indeed, should require—the inclusion of anecdotes about the impact of a particular health hazard where the anecdotes would significantly alter the “total mix” of information made available. Our empirical findings in Part V further support this position.

### *A. Breadth of Disclosure*

What is the breadth of information that must be disclosed in the MSDS? The Hazard Communication Regulation requires several sections of information, including:

- Section 1, Chemical Identification;
- Section 2, Hazard(s) Identification;
- Section 3, Composition/information on ingredients;
- Section 4, First-aid measures;
- Section 5, Fire-fighting measures;
- Section 6, Accidental release measures;
- Section 7, Handling and storage;
- Section 8, Exposure controls/personal protection;
- Section 9, Physical and chemical properties;
- Section 10, Stability and reactivity;
- Section 11, Toxicological information;
- Section 12, Ecological information;
- Section 13, Disposal considerations;
- Section 14, Transport information;
- Section 15, Regulatory information; and
- Section 16, Other information, including date of preparation or last revision.<sup>109</sup>

For the purposes of this Article, we are concerned with Section 2,<sup>110</sup> Hazard(s) Identification. This may include physical dangers, such as explosions,<sup>111</sup> or, more pertinent to our discussion, health hazards.<sup>112</sup> A chemical poses a health hazard where it may cause “acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); or aspiration hazard.”<sup>113</sup>

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109. 29 C.F.R. § 1910.1200(g)(2) (2023).

110. At the time of the Gulf Oil Spill, Hazards Identification was at Section 3.

111. *Id.* § 1910.1200(c) (defining physical hazard).

112. *Id.* § 1910.1200(c) (defining health hazard).

113. *Id.*

Not all health hazards must be disclosed.<sup>114</sup> The Hazard Communication Regulation states that chemical manufacturers should communicate a chemical's "potential hazards," which, of course, is rather broad.<sup>115</sup> However, the standard goes on to say that a potential hazard must be one that can be scientifically validated.<sup>116</sup>

Given the foregoing, determining which health hazards to disclose can be a challenge for manufacturers. Consider *Durez Division of Occidental Chemical Corp. v. OSHA*.<sup>117</sup> In that case, Occidental was the manufacturer of Durez 153, a compound that can be molded into heat resistant handles for pots and pans.<sup>118</sup> When molded by a manufacturer, Durez 153 releases small quantities of phenol vapor into the atmosphere.<sup>119</sup> The MSDS for Durez 153 disclosed that it could cause eye, skin, and respiratory tract irritation, but failed to disclose that overexposure to phenol could cause liver, kidney, or heart damage.<sup>120</sup>

Occidental argued that it need not disclose the hazard of liver, kidney, or heart damage on the MSDS, because the amount of phenol released was too insignificant to pose a realistic threat of such damage.<sup>121</sup> Occidental reinforced its argument by pointing to a study finding that, at the levels involved, phenol was not dangerous (remember, the determination to include, or not include, must be based on scientific validation).<sup>122</sup> The study linked only extremely high levels of phenol (*i.e.*, a level much higher than employees would have encountered) to liver, kidney, and heart damage.<sup>123</sup> However, that link was enough for the court to hold that disclosure was required.<sup>124</sup> That is, the study's scientific validation that phenol *could potentially* cause damage was sufficient to require the warning.<sup>125</sup>

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114. See *Durez Div. of Occidental Chemical Corp. v. OSHA*, 906 F.2d 1, 3-4 (D.C. Cir. 1990) (reaffirming multiple times that disclosure of health hazards is required only "at a given level of exposure" and at certain "projected levels of exposure").

115. See 29 C.F.R. § 1910.1200(a)(2) ("This occupational safety and health standard is intended to address comprehensively the issue of . . . potential hazards. . .").

116. See *id.* § 1910.1200(d)(2) ("Chemical manufacturers . . . shall identify and consider the full range of available scientific literature and other evidence concerning the potential hazards."); *id.* § 1910.1200 app. A.0.2.3 ("The term 'scientifically validated' refers to the process by which the reliability and the relevance of a procedure are established for a particular purpose. Any test that determines hazardous properties, which is conducted according to recognized scientific principles, can be used for purposes of a hazard determination for health hazards.").

117. *Durez*, 906 F.2d at 1.

118. *Id.* at 2.

119. *Id.*

120. *Id.* at 2-3.

121. *Id.* at 3.

122. See *Durez*, 906 F.2d at 3.

123. See *id.* at 3-4.

124. See *id.*

125. See *id.*

In the context of dispersants such as Corexit, scientific studies validate that the chemical may cause blood cell, kidney, and liver damage.<sup>126</sup> Thus, those hazards should be and were listed on the MSDS.<sup>127</sup> There are also reports that Corexit may cause cancer.<sup>128</sup> Should that be included on the MSDS? The connection is much more attenuated.<sup>129</sup> Because there is not any scientific literature that connects Corexit to cancer, it need not be and was not listed as a hazard on the MSDS.<sup>130</sup>

### B. Depth of Disclosure

The Hazard Communication Regulation also provides guidance regarding the depth of disclosure (how much should be said about potential dangers). The Hazard Communication regulation provides a template for what should appear in the Hazard(s) Identification section of the MSDS: “causes damage to . . . (*state all organs affected*) through prolonged or repeated exposure (*state route of exposure . . .*).”<sup>131</sup> There are two parts: (i) health hazard statement (including impacted organ(s)), and (ii) route of exposure.

Further, the health hazard statement itself is standardized. There are sixty health hazard statements integrated from the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).<sup>132</sup> They are coded H300 to H420.<sup>133</sup> The one closest to the Hazard(s) Identification section of the Corexit MSDS is Code H371, “may cause damage to organs.”<sup>134</sup>

Finally, the Hazard Communication Regulation provides: “To ensure that non-standardized information does not lead to unnecessarily wide variation or undermine the required information, supplementary information on the label is limited to when it provides further detail and does not

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126. See D’Andrea & Reddy, *supra* note 8, at 972.

127. Corexit MSDS, *supra* note 16, at 1.

128. Ryan Stuart, *A Key Tool for Cleaning Up Oil Spills Is More Hazardous Than Helpful*, HAKAI MAGAZINE (Dec. 14, 2021), <https://hakaimagazine.com/features/a-key-tool-for-cleaning-up-oil-spills-is-more-hazardous-than-helpful> [<https://perma.cc/Q9PZ-T3L3>] (“The most common were respiratory problems, confusion, kidney and liver damage, and skin and muscle issues, but there were also reports of seizures, paralysis, and rare cancers.”).

129. *Becnel v. BP Expl. & Prod., Inc.*, No. 17-1758-SDD-EWD, 2021 U.S. Dist. LEXIS 185747, at \*5 (M.D. La. Sept. 28, 2021) (“[T]here is no epidemiological literature which causally connects exposure to crude oil or dispersants and salivary cancer.”).

130. Corexit MSDS, *supra* note 16, at 1.

131. 29 C.F.R. § 1910.1200 app. C.2.2.1 (2023).

132. 29 C.F.R. § 1910.1200(a)(1); U.N. Economic Commission for Europe, *Globally Harmonized System of Classification and Labelling of Chemicals (GHS)*, Table A3.1.2, U.N. Doc. ST/SG/AC.10/30/Rev.9 (2021) [hereinafter GHS].

133. GHS, *supra* note 132, at Table A3.1.2.

134. *Id.*

contradict . . . the standardized hazard information.”<sup>135</sup> Depending on how that language is interpreted, it may allow for anecdotes about actual health impacts like those included in Appendix B, if they are found to provide further detail and are not contradictory.

Regardless, our normative position is that the Hazard Communication Regulation should require firms to include a random sample of anecdotes along with any MSDS disclosure materials, either on the MSDS itself or through instructions for accessing anecdotes on a government-run website. Our empirical findings in Part V support that conclusion. But before moving on to our empirical findings, we will draw an analogy to the Securities Laws requirements for disclosing risk.

### *1. An Analogy to Risk Disclosure Under the Securities Laws*

The Securities Laws require that companies disclose facts (including risks) to investors where there is “a substantial likelihood” that those facts would be “viewed by the reasonable investor” as “significantly alter[ing] the ‘total mix’ of information available.”<sup>136</sup> Specifically, the Securities Act of 1933 requires disclosure of risk factors in the Registration Statement (Form S-1), and the Exchange Act of 1934 requires disclosure of risk factors in the Quarterly Report (Form 10-Q) and Annual Report (Form 10-K).<sup>137</sup> In each document, the company must include “a discussion of the material factors that make an investment in the registrant or offering speculative or risky.”<sup>138</sup>

The SEC has instructed companies that “a discussion of risk in purely generic terms does not tell investors *how* the risk may affect their investment in a specific company.”<sup>139</sup> For example, it is not enough for pharmaceutical manufacturers to tell investors that the company’s primary drug may cause adverse events; instead, manufacturers must disclose specific instances of adverse events.

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135. 29 C.F.R. § 1910.1200 app. C.3.1 (2023).

136. *Basic Inc. v. Levinson*, 485 U.S. 224, 231-32 (1988) (citing *TSC Industries, Inc. v. Northway, Inc.*, 426 U.S. 438 (1976)).

137. 17 C.F.R. § 229.105(a) (2021); *see* 17 C.F.R. § 229.10 (2021) (stating that Reg. S-K applies to both Securities Act and Exchange Act disclosures). For copies of the relevant forms, *see Forms List, SEC. & EXCH. COMM’N*, <https://www.sec.gov/forms> [<https://perma.cc/2BWS-TGZP>] (last visited Nov. 27, 2022).

138. 17 C.F.R. § 229.105(a) (2021).

139. Plain English Disclosure, Exchange Act Release No. 33-7497 (Oct. 1, 1998) (emphasis added); *see In re MF Glob. Holdings Ltd. Sec. Litig.*, 982 F. Supp. 2d 277, 318 (S.D.N.Y. 2013) (“By superficially warning of possible risks while failing to disclose critical facts, MF Global was akin to someone who warns his hiking companion to walk slowly because there might be a ditch ahead when he knows with near certainty that the Grand Canyon lies one foot away.”); *Slayton v. Am. Exp. Co.*, 604 F.3d 758, 772 (2d Cir. 2010) (finding that Defendants’ general warning of “potential deterioration in the high-yield sector” did not meaningfully warn of specific risk that “rising defaults on the bonds underlying [the defendant company’s] own investment-grade CDOs would cause deterioration in [the defendant company’s] own portfolio”).

Consider *Silverstrand v. AMAG Pharmaceuticals*.<sup>140</sup> There, AMAG produced Feraheme, an intravenous iron-replacement drug.<sup>141</sup> Two patients that had taken Feraheme had suffered from “life-threatening” anaphylaxis and required hospitalization, and in another instance, Feraheme was linked to the death of a patient.<sup>142</sup> However, the registration statement for the company’s stock superficially warned that “[s]ignificant safety or drug interaction problems could arise” with respect to Feraheme.<sup>143</sup> The court had no difficulty finding that the superficial warning was insufficient.<sup>144</sup> AMAG should have included the specific examples of hospitalization and death because a reasonable investor would find that information important when deciding whether to buy the company’s stock.<sup>145</sup> For example, a prospective investor may find that three instances seem rather rare and invest otherwise. A different prospective investor may find that the three instances are of such a magnitude (including death) that investing is simply too risky.<sup>146</sup> As the court concisely stated, “the riskier Feraheme appeared, the less attractive the drug would be as a method of treatment, and the less likely an investor would be to invest in AMAG, whose profits entirely depended on Feraheme’s commercial success.”<sup>147</sup>

*Matrixx v. Siracusano* presents another example.<sup>148</sup> Matrixx manufactured and marketed Zicam, an over-the-counter cold medicine.<sup>149</sup> As early as 2009, doctors began reporting to Matrixx adverse events, in particular, loss of smell, in clusters of patients who had taken Zicam.<sup>150</sup> In September 2002 and September 2003, additional clusters of patients who suffered from loss of smell after taking Zicam were reported to Matrixx.<sup>151</sup>

In Matrixx’s November 2003 10-Q filed with the SEC, it warned of the potential “material adverse effect [to the company] that could result from

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140. *Silverstrand v. AMAG Pharmaceuticals*, 707 F.3d 95, 99 (1st Cir. 2013).

141. *Id.* at 97.

142. Answering Brief for the AMAG Defendants at 11, *Silverstrand v. AMAG Pharmaceuticals*, 707 F.3d 95, 99 (1st Cir. 2013) (No. 11-2063).

143. *Id.* at 22.

144. *Silverstrand*, 707 F.3d at 103.

145. *Id.* at 103-04.

146. *Id.* at 104.

147. *Id.* It is worth noting that the potential for tort claims by harmed parties also creates a contingent liability that may need to be disclosed to investors under Generally Accepted Accounting Principles (GAAP). See FIN. ACCT. STANDARDS BD., ACCOUNTING FOR CONTINGENCIES, STATEMENT OF FINANCIAL ACCOUNTING STANDARDS NO. 5 (1975) [hereinafter “SFAS No. 5”]. A “loss contingency” is “an existing condition, situation, or set of circumstances involving uncertainty as to possible loss to an entity that will ultimately be resolved when one or more future events occur or fail to occur.” SFAS No. 5, at 4. “[D]isclosure of the contingency shall be made when there is at least a reasonable possibility that a loss or an additional loss may have been incurred.” SFAS No. 5, at 6.

148. *Matrixx Initiatives, Inc. v. Siracusano*, 563 U.S. 27 (2011).

149. *Id.* at 31.

150. *Id.* at 32.

151. *Id.* at 32-33.

product liability claims.”<sup>152</sup> However, it did not include any examples of adverse events—including loss of smell—that would give rise to such product liability claims.<sup>153</sup>

Plaintiff investors brought a securities fraud lawsuit claiming that Matrixx’s failure to include those examples in its disclosure documents rendered them misleading.<sup>154</sup> The lawsuit further claimed that such omissions occurred “in an effort to maintain artificially high prices for Matrixx securities.”<sup>155</sup> Matrixx countered that the examples were not material because they were purely “anecdotal.”<sup>156</sup> The Court disagreed, finding that the stories would “hav[e] significantly altered the ‘total mix’ of information made available”; that is, investors would find them important in deciding to buy or sell the security.<sup>157</sup>

The common thread in *Silverstrand v. AMAG Pharmaceuticals* and *Matrixx v. Siracusano* is that risk disclosures must go beyond superficial statements. Disclosures must include legitimate examples of adverse health events to increase investors’ appreciation of the risk.

The analogy to MSDS disclosure is plain: it is not enough for the MSDS simply to state that a chemical may pose a health hazard. When possible, the MSDS should include legitimate examples to increase workers’ appreciation of the risk.<sup>158</sup>

## 2. *An Analogy to Empirical Methods Under the Securities Laws*

In the last section, we began by pointing out that the Securities Laws require that companies disclose risks to investors where “there is a substantial likelihood that the fact will be viewed by a reasonable investor as significantly altering the ‘total mix’ of information available.”<sup>159</sup> In the real world—*i.e.*, actual securities litigation—this is often accomplished through empirical methods, specifically event studies (“a statistical regression analysis to determine an event’s effect on the price of a stock”).<sup>160</sup>

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152. *Id.* at 34 (quoting app. at 75a-76a).

153. *Id.*

154. *Matrixx*, 563 U.S. at 36.

155. *Id.*

156. *Id.* at 40.

157. *Id.* at 47.

158. It is important to note that we are not suggesting turning non-disclosable information into disclosable information through some form of legal alchemy. The standard for the breadth of information that must be disclosed would remain the same: that which is scientifically validated. Instead, we are suggesting adding to the depth of disclosure by including anecdotes.

159. *Matrixx*, 563 U.S. at 47.

160. Leah Neupert, *A Court’s Guide on How to Gut Precedent by Relying on It: Halliburton II’s Puzzling Effect on Securities-Fraud Class Actions*, 76 LA. L. REV. 225, 236 (2015) (discussing the wide use of event studies to prove or disprove materiality).



Simply put, a plaintiff can show that the omission of a fact was material if later disclosure changes the stock price.<sup>161</sup> An illustrative case is *Marksman Partners, L.P. v. Chantal Pharmaceutical*.<sup>162</sup> Between November 1995 and January 1996, Marksman bought stock in Chantal, a manufacturer of skin care products.<sup>163</sup> One of those products was Ethocyn, a compound designed to eliminate wrinkles.<sup>164</sup> Marksman's purchases took place during a meteoric rise in Chantal's stock price from less than \$1 per share to over \$28 per share.<sup>165</sup> The rise in the stock price was the result of better-than-expected revenues reported by the company.<sup>166</sup> Unfortunately, the earnings were illusory, based on sales that had not yet taken place.<sup>167</sup> When that fact was revealed in a *Barron's* exposé, "Chantal's well-publicized rise came to an abrupt halt."<sup>168</sup>

Marksman sued for securities fraud, one element of which is a misstatement of material fact.<sup>169</sup> The court found that the reported earnings—overstated by \$13 million—would have impacted a reasonable investor's decision to buy or sell the stock.<sup>170</sup> As evidence, the court noted that after the truth came to light, the stock price declined dramatically to just over \$7 per share.<sup>171</sup>

In securities fraud cases, demonstrating statistically significant market reaction to information is now *de rigueur* in U.S. courtrooms.<sup>172</sup> So-called event study methodology<sup>173</sup> is regularly used to prove materiality and reliance

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161. James C. Spindler, *Why Shareholders Want Their CEOs to Lie More After Dura Pharmaceuticals*, 95 GEO. L.J. 653, 663 (2007) ("[M]ateriality... can be proven in two ways—either a market price change or a bottom-up re-creation of a reasonable investor's pricing decision"); see Michael J. Kaufman & John M. Wunderlich, *Regressing: The Troubling Dispositive Role of Event Studies in Securities Fraud Litigation*, 15 STAN. J.L. BUS. & FIN. 183, 201 n. 98 (2009) (collecting cases where materiality shown through change in stock price).

162. *Marksman Partners, L.P. v. Chantal Pharm. Corp.*, 927 F. Supp. 1297 (C.D. Cal. 1996).

163. *Id.* at 1301.

164. *Id.*

165. *See id.* at 1303.

166. *See id.* at 1302.

167. *See id.*

168. *See Marksman Partners, L.P.*, 927 F. Supp. at 1303.

169. *Id.*

170. *Id.* at 1305-06.

171. *Id.* at 1306. For a similar case, see *In re Merck & Co. Securities Litigation*, 432 F.3d 261, 269 (3d Cir. 2005) (discussing price drop as a proxy for materiality).

172. *See In re Vivendi, S.A. Sec. Litig.*, 838 F.3d 223, 253 (2d Cir. 2016) (describing event studies as "standard operating procedure in federal securities litigation"); but see *Gruber v. Gilbertson*, No. 16cv9727, 2021 U.S. Dist. LEXIS 113729, at \*25 (S.D.N.Y. June 17, 2021) ("Defendants' argument that an event study is *de rigueur* misreads the standard. There is no requirement that Plaintiffs conduct an event study.").

173. *See, e.g., Michael Salinger, Standard Errors in Event Studies*, 27 J. FIN. QUANT. ANAL. 39 (1992).

and is also considered vital for calculating damages.<sup>174</sup> Even the Securities and Exchange Commission uses this method to calculate litigation damages and disgorgement penalties.<sup>175</sup>

We argue that if both the courts and regulators use the reaction of observers not directly involved in litigation to determine that information might be “material” to an individual engaged in the trade of financial assets, then there may be value in using the reaction of observers not directly involved in litigation to demonstrate that information might be “material” to an individual engaged in the trade of one’s time and/or labor. The argument is a logical extension of the right of the individual to protect oneself from discernible hazards.

Information is considered “material” in securities law if exposure to that information would have led the individual to make a different decision with one’s financial assets.<sup>176</sup> Seeing how nothing is more precious to an individual than one’s personal assets of good health and long life, we argue that what is considered “material” when determining whether to trade those personal assets may demand broader consideration. We explore what might be considered “material” when it comes to potential chemical exposure in oil spill cleanups in the sections to follow.

#### IV. EMPIRICAL METHODS

In this section, we describe the methodology we employed to assess the degree to which existing disclosure practices in fact materially inform individuals about the risks they face when exposed to chemical dispersants. The methodology is (1) using a psychological prime on research subjects, (2) doing a baseline/pre-treatment evaluation, (3) giving the subjects an experimental treatment, (4) doing a post-treatment evaluation, (5) using valid scales for the pre/post evaluations,<sup>177</sup> and (6) using econometrics to compare the evaluations (post vs. pre within each treatment group, and both pre vs. pre and post vs. post across the different treatment groups). This methodology is common in psychology and micro-organizational research.<sup>178</sup>

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174. Jonah B. Gelbach et al., *Valid Inference in Single-Firm, Single-Event Studies*, 15 AM. L. & ECON. REV. 495, 496 (2013) (“Event studies can be used to address directly the materiality and loss causation elements.”); Kaufman & Wunderlich, *supra* note 161, at 187 (“The interrelated questions of materiality, reliance, loss causation, and damages all require an event study for their resolution.”); In re Gaming Lottery Sec. Litig., 96 Civ. 5567 (RPP), 2001 U.S. Dist. LEXIS 2034, at \*55-\*56 (S.D.N.Y. Feb. 27, 2001) (holding that event study established loss causation).

175. Sanjai Bhagat & Roberta Romano, *Event Studies and the Law: Part II: Empirical Studies of Corporate Law*, 4 AM. L. & ECON. REV. 380, 399, 415 (2002).

176. *Basic Inc. v. Levinson*, 485 U.S. 244, 231-32 (1988).

177. Bhagat & Romano, *supra* note 175, at 415 (“[T]he SEC has used the methodology to establish liability and the measure of damages”).

178. See, e.g., ROGER TOURANGEAU ET AL., *THE PSYCHOLOGY OF SURVEY RESPONSE* (2000).

The treatment we applied to our research subjects is the provision of anecdotes by individuals who had previously worked on oil spill cleanups, which we hypothesized would materially impact subjects' decision-making. Our theory regarding the impact of anecdotes is anchored in two forms of evidence. First, there can be no denying that the availability of anecdotes materially affects the modern trade of goods and services.<sup>179</sup> Auction websites, online retailers, blogs, and commentary features on news services all provide access to anecdotes from individuals (often in the form of reviews) whom few users of these sites will ever meet. Still, despite their relative anonymity, these personal anecdotes have tremendous sway on users (*i.e.*, the anecdotes allow consumers to make better decisions). For example, negative ratings on e-commerce sites strongly influence the final bid price at auctions.<sup>180</sup> Second, given that the rationale for OSHA and EPA regulations (including disclosure requirements) is to allow individuals to protect themselves, it makes sense to allow for the voicing of anecdotes in a more formal way and for those anecdotes to become part of the information available to workers—whether employees (compensated) or volunteers (uncompensated)—participating in oil spill cleanup efforts.

### A. Information Quality Assessment

To explore the impact of access to anecdotes, we needed to assemble a collection from workers exposed to hazardous chemicals in prior oil spill cleanup efforts. We focused our attention on descriptions either of the work environment—which were intended to capture the degree to which a cleanup worker might be exposed to hazardous chemicals—or of LMPCs that the cleanup worker believed were attributable to their work in cleanup activities.<sup>181</sup> In the end, the anecdotes we assembled came from four newspaper articles and one book that described the impact of the Exxon Valdez incident on an Alaskan community.<sup>182</sup> All the descriptions we used are publicly available in published form—either as direct quotes from

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179. See Glen L. Urban, *Customer Advocacy: A New Era in Marketing?*, 24 J. PUB. POL. & MKTG. 155 (2005); Norris Bruce, Eman Haruvy & Ram Rao, *Seller Rating, Price, and Default in Online Auctions*, 18 J. INT. MKTG. 37, 48 (2004).

180. Stephen S. Standifird, *Reputation and E-Commerce: eBay Auctions and the Asymmetrical Impact of Positive and Negative Ratings*, 27 J. MGMT. 279, 279 (2001). Other research suggests that a national culture may play a role in determining the value of such online seller ratings. See, e.g., Arun Vishwanath, *Manifestations of Interpersonal Trust in Online Interaction: A Cross-Cultural Study Comparing the Differential Utilization of Seller Ratings by eBay Participants in Canada, France, and Germany*, 6 NEW MEDIA & SOC. 219, 219 (2004) (suggesting that seller ratings have little effect in cultures exhibiting high levels of interpersonal trust, and have a large effect in low trust cultures).

181. For a discussion of LMPC, see *supra* Part I.C.

182. Sources of these descriptions are as follows: Murphy, *supra* note 11; Stranahan, *supra* note 11; William P. Coughlin, *Valdez Cleanup Linked to Ailments*, BOSTON GLOBE, May 10, 1992, at 8; William P. Coughlin, *Illness Tied to Exxon Cleanup is Cited in Spate of Lawsuits*, BOSTON GLOBE, April 12, 1992, at 27; RIKI OTT, SOUND TRUTH AND CORPORATE MYTHS 21 (2004).

individuals or as summaries of interview content. When necessary, we edited the excerpts to remove identifying information, ensuring that the descriptions read as first-person utterances, or shortened them for brevity.

We tested the effects of these anecdotes on two samples of participants, which we refer to as Subject Pool A and Subject Pool B. We used Subject Pool A to test whether the anecdotes influenced people's perceptions of the risks of oil spill cleanup efforts. Then, we used Sample B to test how the ratio of work environment to health condition anecdotes affected people's perceptions of this risk, their willingness to participate in the cleanup effort, and their demanded compensation, compared to the MSDS alone. Using Sample B also allowed us to observe if a certain ratio of health condition anecdotes to work environment anecdotes creates a "tipping point" in willingness to participate and compensation demanded. Testing the effects of the anecdotes in multiple samples also allowed us to see if any observed effects were replicable, increasing our confidence in their reliability.

### 1. *Subject Pool A*

We recruited our first pool of subjects from the pay-per-user subject pool Amazon Mechanical Turk.<sup>183</sup> Responses from subject pools have been shown to be valid and provide numerous advantages, including subject anonymity and representativeness of the general population.<sup>184</sup> Because this subject pool is online, all experimental manipulations and questionnaire completion took place through the online survey software Qualtrics.<sup>185</sup>

Upon entering the study, subjects were given an informed consent form.<sup>186</sup> Subjects who agreed to participate were then shown a video of news

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183. AMAZON MECHANICAL TURK, <https://www.mturk.com/mturk/welcome> [<https://perma.cc/QY24-Q45X>] (last visited Sept. 24, 2023).

184. Gabriele Paolacci et al., *Running Experiments on Amazon Mechanical Turk*, 5 JUDGMENT & DECISION MAKING 411, 414 (2010).

185. QUALTRICS, *Rapidly Collect, Analyze and Act on Business Insights at Scale*, <https://www.qualtrics.com/rs/#academic> [<https://perma.cc/ES27-WLH2>] (last visited Sept. 24, 2023).

186. Informed consent releases are required under *The Belmont Report's* "Respect for Persons" principle. See NATIONAL COMMISSION FOR THE PROTECTION OF HUMAN SUBJECTS OF BIOMEDICAL AND BEHAVIORAL RESEARCH, THE BELMONT REPORT: ETHICAL PRINCIPLES AND GUIDELINES FOR THE PROTECTION OF HUMAN SUBJECTS OF RESEARCH (Apr. 18, 1979) ("Respect for persons incorporates at least two ethical convictions: first, that individuals should be treated as autonomous agents, and second, that persons with diminished autonomy are entitled to protection. The principle of respect for persons thus divides into two separate moral requirements: the requirement to acknowledge autonomy and the requirement to protect those with diminished autonomy. An autonomous person is an individual capable of deliberation about personal goals and of acting under the direction of such deliberation. To respect autonomy is to give weight to autonomous persons' considered opinions and choices while refraining from obstructing their actions unless they are clearly detrimental to others. To show lack of respect for an autonomous agent is to repudiate that person's considered judgments, to deny an individual the freedom to act on those considered judgments, or to withhold information necessary to make a considered judgment, when there are no compelling reasons to do so.").

coverage of the Gulf Oil Spill.<sup>187</sup> The purpose of this video was to evoke a cognitive frame regarding an oil spill, whose effects on the environment and local communities require human effort to ameliorate.<sup>188</sup>

After viewing the video, subjects were given a questionnaire to assess their baseline willingness to engage with the issues under study.<sup>189</sup>

Internet Script: “*You have just viewed a video describing a large scale oil spill. Please provide responses to the following questions.*”

The questionnaire used 7-point Likert-type scales,<sup>190</sup> which are well established in psychology and micro-organizational behavior studies as valid means to measure focal constructs.<sup>191</sup>

After completing the baseline questionnaire, subjects were shown a random sample of five anecdotes describing either the work environment or health conditions putatively connected to prior oil spill cleanup activities.<sup>192</sup> After reading each individual anecdote, the subjects were asked to rate the relative risk of participating in cleanup efforts as well as how the content of the anecdote might affect their willingness to participate in cleanup efforts.<sup>193</sup>

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187. CNN, *BP Oil Rig, Deepwater Horizon Explodes and Sinks Off the Coast of Mexico*, YOUTUBE (Apr. 22, 2010), <https://www.youtube.com/watch?v=82fydC5SMWQ> [<https://perma.cc/E3PN-FKAL>].

188. Substantial experimental research shows that videos can be an effective form of psychological priming. See, e.g., Dianne M. Tice, Roy F. Baumeister, Dikla Shmueli & Mark Muraven, *Restoring the Self: Positive Affect Helps Improve Self-Regulation Following Ego Depletion*, 43 J. EXPERIMENTAL SOC. PSYCH. 379, 380 (2007); Kathleen D. Vohs & Todd F. Heatherton, *Self-Regulatory Failure: A Resource-Depletion Approach*, 11 PSYCH. SCI. 249, 250 (2000); Barbara L. Fredrickson, Roberta A. Mancuso, Christine Branigan & Michele M. Tugade, *The Undoing Effect of Positive Emotions*, 24 MOTIVATION & EMOTION 237, 242 (2000); Kyle J. Emich, *Who's Bringing the Donuts: The Role of Affective Patterns in Group Decision Making*, 124 ORG. BEHAV. & HUM. DECISION PROCESSES 122 (2014).

189. The baseline questions read: “How would you rank your willingness to participate in cleanup efforts?”, “Would you be willing to participate in cleanup efforts as a volunteer?”, “Would you be willing to participate in cleanup efforts as a paid employee?”, and “Would you be willing to participate in cleanup efforts if all travel and room & board expenses were covered?” The questionnaire also included one open answer question as follows: “For one week’s work, how much money would you demand in exchange for your participation in the cleanup effort?”

190. The 7-point Likert-type scales were presented as follows: (1) Highly Unlikely, (2) Moderately Unlikely, (3) A Little Unlikely, (4) Neither Likely nor Unlikely, (5) A Little Likely, (6) Moderately Likely, (7) Highly Likely. Qualtrics randomized whether the scale began with (1) or (7) for each study subject to control for recency bias that may result from the appearance of initial information. See Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, 185 SCI. 4157, 1124, 1127 (1974) (discussing how individuals add weight in their judgments based on information that is more easily recalled or salient to them).

191. Rensis Likert, *A Technique for the Measurement of Attitudes*, 140 ARCHIVES OF PSYCH. 1 (1932).

192. The script read: “We are now going to ask you to read five quotations from people who worked on prior cleanup efforts. After each quotation, please answer the two questions, then continue to the next stage.”

193. Randomized scale ordering of 7-point Likert scale: (1) Highly Non-Risky, (2) Moderately Non-Risky, (3) A Little Non-Risky, (4) Neither Risky nor Non-Risky, (5) A Little Risky, (6) Moderately Risky, (7) Highly Risky for the question: “Having read this comment, how would you rate the relative risk of participating in cleanup efforts?” Randomized scale ordering of 7-point Likert scale: (1) Highly Less Likely to Participate, (2) Moderately Less Likely to Participate, (3) A Little Less Likely to Participate, (4)

The average rating for each of these anecdotes can be seen in Appendix B. Finally, before finishing, the subjects were asked to complete a demographics questionnaire.<sup>194</sup> The entire experiment took about fifteen minutes.

## 2. Subject Pool B

We also recruited the second pool of subjects from Amazon Mechanical Turk.<sup>195</sup> As with Subject Pool A, subjects who agreed to participate in the study after reading the Informed Consent form were shown the oil spill news coverage, then asked to complete the same post-video questionnaire to assess their baseline willingness to engage with the issue of study.

After completing the baseline questionnaire, subjects were randomly assigned to one of seven different experimental conditions. Participants in the first condition were shown a copy of the MSDS for a chemical dispersant previously used in oil spill cleanup efforts in the United States. The MSDS for the dispersant was publicly distributed by the manufacturer as part of ‘Community Right-to-Know’ disclosure requirements in advance of the products use in the Gulf Oil Spill.<sup>196</sup>

Internet Script: “*We’d like for you read the following Material Safety Data Sheet for a chemical dispersant that may be used in the cleanup efforts. Once you have finished, please provide answers to the questions.*”

After reading the MSDS, we directed subjects to complete a questionnaire assessing the degree to which exposure to the information within the MSDS altered their perceptions of the relative risk of the cleanup effort and the willingness to participate in the cleanup effort.<sup>197</sup>

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Neither More nor Less Likely to Participate, (5) A Little More Likely to Participate, (6) Moderately More Likely to Participate, (7) Highly More Likely to Participate for the question: “Having read this comment, how might it affect your willingness to participate in cleanup efforts?” For the baseline survey, see *supra* note 189.

194. Questions included: “Age” (open answer); “Please indicate your gender” for choices “Male” and “Female”; “Please indicate your ethnicity” for choices “White”, “Black”, “Asian”, “Hispanic”, and “Other”. Political leanings were measured through two questions: “First, how politically CONSERVATIVE do you consider yourself” for seven-point scale with three anchor points for “Not Conservative at all”, “Moderately Conservative” and “Extremely Conservative”; and “Now, please indicate how politically LIBERAL you consider yourself” with a similar seven-point scale with three anchor points for “Not Liberal at all”, “Moderately Liberal” and “Extremely Liberal.” Religiosity was measured through three questions: “What religion do you most identify with? If you do not identify with any, please leave this question blank” (open answer) and “How strongly do you identify with the religion you listed in the previous questions (if you did)” with choices “Do not identify at all”, “Slightly identify”, “Marginally identify”, “Greatly identify”, and “Completely identify.” Also, “Finally, how often do you attend organized religious events?” with choices “Daily”, “Once a week”, “More than once a week”, “Once a month”, “More than once a month”, “A few times a year”, “Once a year”, “Never.”

195. See AMAZON MECHANICAL TURK, <https://www.mturk.com/mturk/welcome> [<https://perma.cc/QY24-Q45X>] (last visited Sept. 24, 2023).

196. See Corexit MSDS, *supra* note 16, at 8.

197. For the risk and willingness assessment questionnaire, see *supra* note 193.

Subjects in the other six conditions were provided a randomly generated list of ten of the anecdotes assessed by Subject Pool A. These anecdotes were described as originating from a (non-existent) Federal Government website that allows former participants in such cleanup efforts to comment on their experiences. The anecdotes were described as a random sample of those anonymously provided comments.

Internet Script: *“The Federal Government has put together a website that allows former participants in such cleanup efforts to comment on their experiences. Any impacts described may or may not have occurred as a result of participation in said cleanup efforts, and represent only individual opinions about the experience. On the next page, you will see a random sample of those anonymously provided comments. Once you have finished, please provide answers to the questions that follow.”*

Subjects were provided with one of six different combinations of anecdotes:

100%	Work	Environment	Anecdotes	(10	anecdotes)	+
0%	Health Condition	Anecdotes	(0	anecdotes)		
80%	Work	Environment	Anecdotes	(8	anecdotes)	+
20%	Health Condition	Anecdotes	(2	anecdotes)		
60%	Work	Environment	Anecdotes	(6	anecdotes)	+
40%	Health Condition	Anecdotes	(4	anecdotes)		
40%	Work	Environment	Anecdotes	(4	anecdotes)	+
60%	Health Condition	Anecdotes	(6	anecdotes)		
20%	Work	Environment	Anecdotes	(2	anecdotes)	+
80%	Health Condition	Anecdotes	(8	anecdotes)		
0%	Work	Environment	Anecdotes	(0	anecdotes)	+
100%	Health Condition	Anecdotes	(10	anecdotes)		

After reading the anecdotes, we directed the subjects to complete another questionnaire assessing the degree to which exposure to the information within the anecdotes altered their perceptions of the cleanup effort.<sup>198</sup> Finally, the subjects were asked to re-answer the five baseline questions<sup>199</sup> and then complete a demographics questionnaire.<sup>200</sup> The entire experiment for Subject Pool B took about fifteen minutes.

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198. The anecdote subjects were given the same post-manipulation assessment as those who received the MSDS manipulation. *See supra* note 193.

199. For the baseline survey, see *supra* note 189.

200. For the demographic questionnaire, see *supra* note 194.

## V. RESULTS

It is clear that exposure to the anecdotes impacted subjects' assessment of relative risk and their willingness to participate in the cleanup effort. One survey respondent who decided to leave a comment for the researchers wrote, "The descriptions of worker conditions were horrible. I don't think anyone should volunteer for that kind [of work] if they aren't guaranteed at least a bare minimum of safety." Another wrote, "The quotes were very disturbing to think about!"

Still, the survey respondents were not universally confident in the verity of the quotations. One respondent wrote, "I wonder if the scenarios listed were of direct effect of participating in the cleanup spill, or if they were just a result of something else." Another wrote, "I was skeptical about the workers' health claims. I know nothing about oil causing diseases, so didn't buy their unproven stories." Still another, "No human endeavor is without risk. Our objective is to mitigate risk and try to keep things as safe as we can. We need to improve safety when cleaning up the inevitable problems that come up."

Beyond these written descriptions, the research subjects also provided numerical ratings regarding various dimensions of risk, wages demanded, and so forth. We detail those ratings hereafter.

### A. Risk Assessment

Our results show that receiving information regarding potential risks led those who might work either as an employee or a volunteer in oil spill cleanup efforts to assess the risk levels of said work differently. Subjects who received the traditional MSDS form—which lists both exposure risk and specific health risks—rated the relative risk level of cleanup initiatives as “a little risky” ( $M = 5.06$ ,  $SD = 1.81$ ), while those who received anecdotes from those who previously worked on such cleanup efforts perceived a much higher risk. Subjects who saw only descriptions of the degree to which they might be exposed to chemicals (e.g., “the oil was all over my back”) perceived a statistically significantly higher level of risk (between “moderately risky” and “highly risky”) than those exposed to the MSDS, even though no health consequences were revealed in the anecdotes themselves ( $M = 6.28$ ,  $SD = 0.73$ ). A single-tailed t-test, testing whether the anecdotes would have a stronger effect than the MSDS, and a more conservative double-tailed t-test, testing whether the anecdotes would have either a stronger or weaker effect than the MSDS, both indicated that there was a significant difference in participants' perceptions of cleanup risk between those exposed to the anecdotes and those only exposed to the MSDS ( $F(1, 61) = 3.53$ ,  $ps < 0.001$ ). Moreover, those exposed solely to anecdotes involving worker health assessed their risk as between “moderately risky” and “highly risky.” Again, this was much higher ( $M = 6.53$ ,  $SD = 0.80$ ) than



the MSDS treatment group as indicated by both a single-tailed and double-tailed t-test ( $F(1, 61) = 4.19, ps < 0.001$ ). There was no statistical difference between the risk assessments of those subjects exposed to environmental versus health-related anecdotes as indicated by a two-tailed t-test ( $F(1, 62) = 1.30, p = 0.20$ ). However, if we assume that subjects will perceive more risk after reading health-related anecdotes and test this directional assumption with a one-tailed t-test, we find support for it, given a  $p$ -threshold of 0.10 ( $p = 0.10$ ).

### B. Willingness to Participate in Cleanup

Pre-treatment subjects showed no statistically significant difference in their expressed willingness to participate in cleanup efforts, falling between “neither likely nor unlikely” and “a little likely” across all three groups. This was expected, given that we randomly assigned participants to condition. Subjects provided the MSDS form saw their initial willingness to cleanup between “neither likely nor unlikely” and “a little likely” ( $M = 4.32, SD = 2.01$ ). After reading the content of the MSDS form, those subjects rated their willingness as “a little less likely to participate” ( $M = 3.06, SD = 1.26$ ). That willingness level was a statistically significant change from a baseline of “(4) neither more nor less likely to participate” ( $F(1, 30) = 4.12$ ) for both the double-tailed test (that there was a change in either direction) and the single-tailed test (that willingness to participate would drop after reading the MSDS) ( $ps < 0.001$ ).

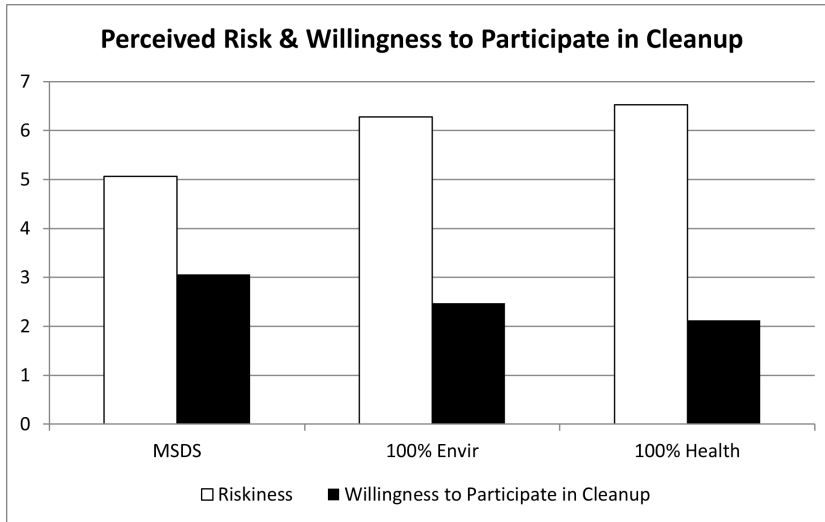
For those exposed to the 100% environmental conditions anecdotes, pre-treatment willingness was between “neither likely nor unlikely” and “a little likely” ( $M = 4.65, SD = 1.64$ ). After reading the anecdotes, those subjects rated their willingness as between “a little less likely to participate” to “moderately less likely to participate” ( $M = 2.47, SD = 1.45$ ). That willingness level was a statistically significant drop from a baseline of “(4) neither more nor less likely to participate” for both the double-tailed test (that there was a change in either direction,  $F(1, 31) = 5.94, p < 0.0001$ ) and the single-tailed test (that willingness to participate would drop after reading the anecdotes,  $p = 0.0001$ ).

A similar pattern emerged for the 100% health ailments treatment group, with pre-treatment willingness ( $M = 4.28, SD = 1.76$ ) and post-treatment willingness showing a drop in willingness to between “a little less likely to participate” to “moderately less likely to participate” ( $M = 2.13, SD = 1.64$ ). That was (again) a statistically significant drop from the baseline of no change for both the double-tailed and single-tailed tests ( $F(1, 31) = 6.46, ps < 0.0001$ ).

There was no significant difference between the anecdote groups, though both were statistically lower than the MSDS group (environmental anecdotes: double-tailed test ( $F(1, 61) = 1.73, p < 0.10$  and single-tailed test,

$p < 0.05$ ; health anecdotes: double-tailed test ( $F(1, 61) = 2.54, p < 0.05$  and single-tailed test,  $p < 0.01$ ). As such, although participants in all three conditions perceived more risk after receiving information, those participants receiving either type of anecdote perceived significantly more risk (assessed statistically) than those only receiving the MSDS. Figure 2 summarizes the assessments of both perceived riskiness and willingness to participate in cleanup efforts for each of the three subject groups.

Figure 2: Perceived Risk & Willingness to Participate in Cleanup



### C. Willingness to Volunteer

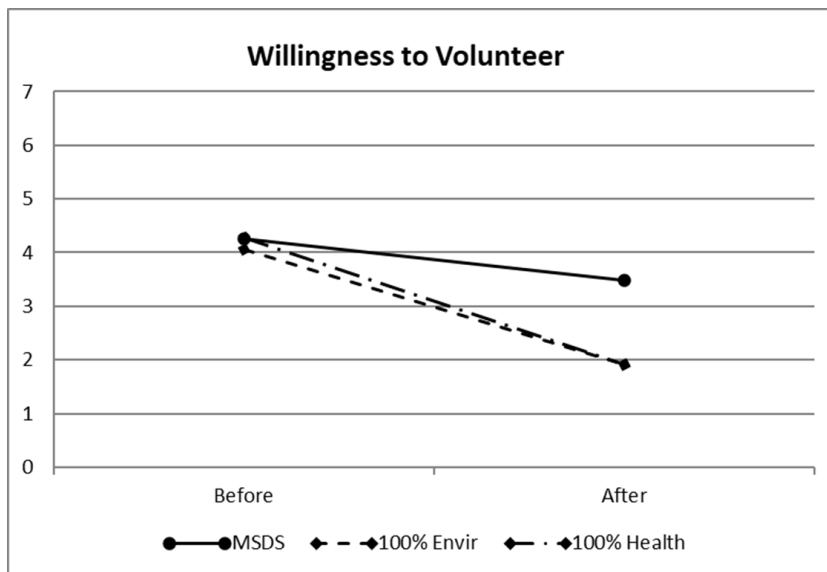
Pre-treatment subjects showed a similar profile in their willingness to volunteer in cleanup efforts, with no significant differences observed between the groups (between “neither likely nor unlikely” and “a little likely”). Once exposed to information on the risks involved, however, willingness to volunteer changed. For the MSDS group, pre-treatment willingness to volunteer was between “neither likely nor unlikely” and “a little likely” ( $M = 4.26, SD = 1.88$ ); that level fell somewhat after exposure to the information on the MSDS forms to between “neither likely nor unlikely” and “a little unlikely” ( $M = 3.48, SD = 1.96$ ). The drop was significant in a single-tailed t-test (that willingness to volunteer would decrease after viewing the MSDS material,  $F(1, 30) = 3.17, p = 0.002$ ) and in a double-tailed t-test (that the willingness to volunteer would change somehow,  $F(1, 30) = 3.17, p = 0.004$ ).

This drop was even larger among the anecdote treatment groups. For subjects exposed to the purely environmental conditions treatment, pre-treatment willingness to volunteer went from “neither likely nor unlikely”

levels ( $M = 4.06$ ,  $SD = 1.79$ ) to between “moderately unlikely” and “highly unlikely” ( $M = 1.91$ ,  $SD = 1.25$ ,  $F(1, 31) = 7.07$ ,  $p < 0.001$ ). The drop was significant under both single-tailed and double-tailed t-tests ( $ps < 0.001$ ).

A similar drop also occurred in the health ailment anecdote treatment group, with pre-treatment willingness ( $M = 4.28$ ,  $SD = 1.67$ ) falling significantly post-treatment ( $M = 1.90$ ,  $SD = 1.49$ ), as indicated by both single-tailed and double-tailed t-tests ( $F(1, 31) = 7.82$ ,  $p < 0.001$ ). There was no significant difference in the drop in willingness to volunteer between the anecdote treatment groups, but both were significantly different from those who received the MSDS (environmental anecdotes,  $F(1, 61) = 3.81$ : single-tailed and double-tailed t-tests,  $ps < 0.001$ ; health anecdotes,  $F(1, 61) = 3.60$ : single-tailed and double-tailed t-tests,  $ps < 0.001$ ). Figure 3 summarizes these changes in willingness to volunteer for each of the three subject groups.

Figure 3: Willingness to Volunteer in Cleanup Efforts



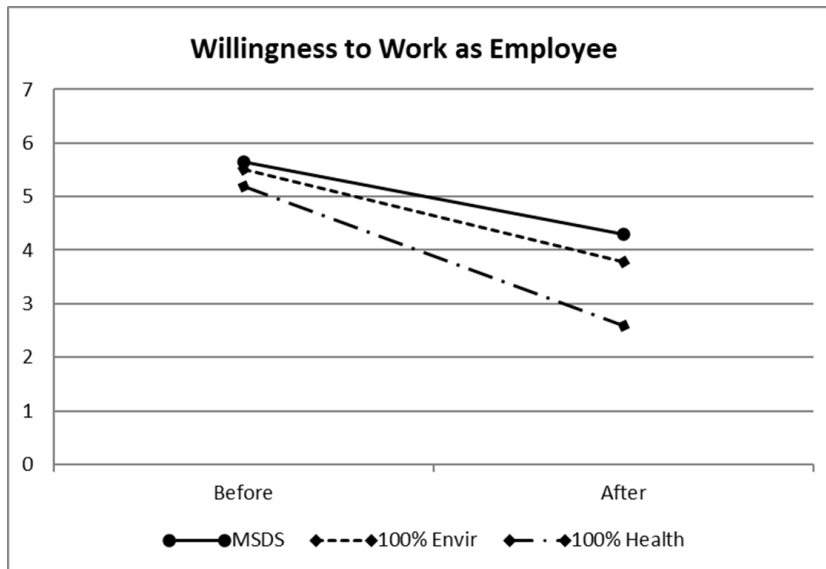
#### D. Willingness to Work as Employee

Across all pre-treatment subjects, there was a higher level of willingness to work as an employee ( $M = 5.35$ ,  $SD = 1.65$ ; between “a little likely” and “moderately likely”) than as a volunteer ( $M = 4.07$ ,  $SD = 1.86$ ; between “neither likely nor unlikely” and “a little likely”), which is logical. This difference was statistically significant as indicated by both a single-tailed and double-tailed t-test ( $F(1, 226) = 12.40$ ,  $ps < 0.001$ ). As with our other pretest measure, there was no significant difference between the three treatment groups in their willingness to work as an employee on cleanup endeavors at the pre-treatment stage. But, once again, information disclosure altered the willingness to participate in cleanup efforts. For the MSDS treatment group,

the pre-treatment willingness to work as an employee was between “a little likely” and “moderately likely” ( $M = 5.65$ ,  $SD = 1.50$ ); post-treatment members of the group reported lower willingness to work as an employee ( $M = 4.29$ ,  $SD = 2.08$ ), indicated by both a single-tailed t-test (that the MSDS would lower willingness) and a double-tailed t-test (that the MSDS would materially impact the willingness in some way,  $F(1, 30) = 4.43$ ,  $ps < 0.001$ ). For subjects in the 100% environmental conditions group, pre-treatment levels were between “a little likely” and “moderately likely” ( $M = 5.50$ ,  $SD = 1.61$ ); post-treatment members of the group reported a drop to between “neither likely nor unlikely” and “a little unlikely” ( $M = 3.78$ ,  $SD = 2.12$ ). This drop was statistically significant as indicated by both a single-tailed and double-tailed t-test: ( $F(1, 31) = 5.69$ ,  $ps < 0.001$ ). The drop for the environmental conditions group was not significantly different from the MSDS group (double-tailed t-test:  $F(1, 61) = 0.96$ ,  $p = 0.34$ ).

In contrast, presenting health ailments information seemingly does alter the willingness to work as an employee more meaningfully than mere exposure to the MSDS. For subjects exposed to the 100% health ailments treatment, pre-treatment willingness was between “a little likely” and “moderately likely” ( $M = 5.19$ ,  $SD = 1.51$ ). Post-treatment willingness was between “a little unlikely” and “moderately unlikely” ( $M = 2.59$ ,  $SD = 2.01$ ). This change was highly significant as indicated by both a single-tailed and double-tailed t-test ( $F(1, 31) = 6.50$ ,  $ps < 0.001$ ). This level of willingness to work as an employee on cleanup initiatives was significantly lower post-treatment for this group than for the MSDS treatment group, as indicated by both the single-tailed t-test (that the health anecdotes would have a greater impact on willingness than the potential ailments list in the MSDS,  $F(1, 61) = 3.29$ ,  $p < 0.001$ ) and the double-tailed t-test (that one would be lower than the other,  $p = 0.002$ ). In addition, the health anecdotes were more impactful than the environmental conditions anecdotes as indicated by both a single-tailed t-test that the health anecdotes would have greater impact on willingness than the environmental conditions anecdotes ( $F(1, 62) = 2.30$ ,  $p = 0.01$ ) and the double-tailed t-test that there would be a difference in either direction ( $p = 0.03$ ). A closer examination of the mixed treatment conditions shows that the tipping point for subjects to reduce their willingness to work as an employee on cleanup initiatives occurs when at least forty percent of the anecdotes shown to the candidate concern health ailments ( $ps < 0.05$ ). Figure 4 summarizes these changes in willingness to work as an employee in cleanup efforts for each of the three subject groups.

Figure 4: Willingness to Work as Employee in Cleanup Efforts



### E. Wage Demands

Because wage demands reached absurd levels (e.g., \$50 million for one week's work) in some cases, massive standard deviations made t-tests of the raw data challenging. We therefore decided to set a cap of \$50,000 for one week's work (i.e., \$10,000 a day) for any amount listed over \$50,000. Restraining the upper limit in this way allowed us to take a very conservative test of the differences under our treatments and quantify the precise tipping point at which wage demands increased in statistically significant ways. Results utilizing this capped data show that the pre-treatment wage demands ( $M = \$726.55$ ,  $SD = \$768.35$ ) and post-treatment wage demands ( $M = \$1,714.00$ ,  $SD = \$3,629.41$ ) for subjects given the traditional MSDS forms fell just out of statistical significance for a double-tailed t-test (that the wage demanded would change in either direction given a  $p$ -threshold of 0.10,  $F(1, 30) = 1.69$ ,  $p = 0.10$ ), but were significant using a one-tailed t-test ( $p = 0.05$ ). Subjects given 100% environmental condition anecdotes saw no statistically significant demand difference in wages between pre-treatment ( $M = \$3,991.50$ ,  $SD = \$17,534.86$ ) and post-treatment ( $M = \$5,226.88$ ,  $SD = \$12,241.65$ ,  $F(1, 31) = 0.54$ ,  $p = 0.59$ ). However, those who received 100% health-related anecdotes had a substantially higher wage demand between pre-treatment ( $M = \$1,205.78$ ,  $SD = \$1,348.13$ ) and post-treatment ( $M = \$16,289.94$ ,  $SD = \$21,623.41$ ) as indicated by both a single-tailed and double-tailed t-test ( $F(1, 31) = 4.07$ ,  $ps < 0.001$ ). A closer examination of the mixed treatments shows that on average, any subject exposed to at least forty percent health-related anecdotes had a statistically significantly higher wage

demand than they otherwise would have ( $ps < 0.01$ , single-tailed t-test). Pre-treatment wage demands were not significantly different across all subjects.

## VI. IMPLICATIONS OF FINDINGS

The purpose of the OSHA and “Community Right-to-Know” disclosure requirements are to arm individuals with vital information necessary to make prudent judgments. Our results show that the MSDS, released as part of those disclosure requirements, impacts the decision-making process of individuals who expressed intent to participate in cleanup efforts. These findings support the premise that providing such information aids in decision-making. If one assumes that individuals should have access to all information necessary to make a sound decision—especially where that decision may impact their health—then it is an unacceptable state of affairs that some individuals may not be receiving such information. Yet, as we discussed in Part II, whether a cleanup worker receives the MSDS depends on whether they are an employee or volunteer, and whether they are subject to OSHA or EPA HAZWOPER. As stated at the end of Part II, the relevant agencies—and if necessary, Congress—should engage in a concerted effort to harmonize those statutes and regulations to best protect employees and volunteers alike.

More significantly, our results also show that personal anecdotes from a hypothetical government website featuring descriptions by former cleanup participants have a substantially higher impact on decision-making than the traditional MSDS. Our experimental manipulations show that when potential participants in cleanup activities are provided real-life descriptions of the degree to which they might be exposed to the chemicals described in the MSDS, their willingness to participate in cleanup activities—and the wages they demand to offset the risk they now understand through these anecdotes—are statistically significantly altered. Moreover, when those anecdotes include real-life descriptions of health conditions that may or may not be attributable to the chemicals covered by the MSDS but believed to be so by former cleanup participants, the willingness to participate is impacted even more strongly. The results suggest that a pairing of real-world descriptions with the MSDS are far more informative to individuals who may face material risk from exposure to hazardous chemicals than just the MSDS alone.

Our examination of the impact of personal anecdotes on decision-making with respect to potential cleanup efforts following oil spills suggest that there may be value for the Federal Government to provide a venue for such commentary. This is not a radical idea. The FDA already does

something like this with medical devices.<sup>201</sup> Users of medical devices can report their own adverse experience, and the anecdote is searchable on the Manufacturer and User Facility Device Experience (MAUDE) database.<sup>202</sup>

We believe that authority to make such a change to existing disclosure requirements resides in the OSH Act, which reads:

The Secretary, in promulgating standards dealing with toxic materials or harmful physical agents under this subsection, shall set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life. Development of standards under this subsection shall be based upon research, demonstrations, experiments, and such other information as may be appropriate. In addition to the attainment of the highest degree of health and safety protection for the employee, other considerations shall be the latest available scientific data in the field, the feasibility of the standards, and experience gained under this and other health and safety laws. Whenever practicable, the standard promulgated shall be expressed in terms of objective criteria and of the performance desired.<sup>203</sup>

Once the proposed anecdote website is constructed and made available for commentary from individuals involved in former or current cleanup efforts, the collected anecdotes could be made available in several possible ways. First, when provided an MSDS, an individual could also be provided with the internet URL to the website, granting those interested in accessing additional information the opportunity to do so at their leisure. One shortcoming of this approach, however, is that it may place a burden on individuals who do not have the necessary time or resources to access this information on their own.

The second option would be a requirement that a random sample of anecdotes be included in paper form with every MSDS distributed. This “mandated option” would ensure that all individuals are given access to what our results suggest is material information on the potential risks involved with oil cleanup efforts. Our findings show that even with only ten anecdotes, decision-making is meaningfully altered, and when four of those ten anecdotes contain information about health ailments, decision-making is even more impacted.

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201. See *MAUDE - Manufacturer and User Facility Device Experience*, U.S. FOOD AND DRUG ADMIN., <https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfmaude/TextSearch.cfm> [<https://perma.cc/9YSJ-MWMN>] (last visited Sept. 27, 2023).

202. *Id.* For example, one user of a moisturizing mouth spray reported to MAUDE, “I accidentally sprayed too far back in my throat, and I immediately felt a horrible burning sensation. It hurt when I breathed, and I couldn’t get rid of the pain.” See *id.* (Choose “all years” and enter search term “3012293198-2019-00056[.]”).

203. 29 U.S.C. § 655(a)(5).

If the true purpose of the MSDS is to assist decision-making on the part of individuals who could be exposed to the dangers listed on the MSDS, rather than to reduce legal liability for firms in the case of said exposure, then it is vital that the language disclosing the risks be accessible to its recipients. Within the legal community, there is a long-standing debate about the challenges that “legalese” presents to lay persons.<sup>204</sup> Federal agencies themselves have explored how to reduce legalese in disclosure requirements and to increase the usage of “plain English” instead.<sup>205</sup> Even clinical trials in the medical field have struggled with determining whether patients truly understand their risks when consenting to treatments.<sup>206</sup> Across these different professions, information that may be discounted or ignored should be replaced or supplemented with information that resonates with the readers.

We propose that a supplemental system would best meet the needs of decision-makers, wherein individuals receive both the MSDS and anecdote disclosures.<sup>207</sup> Our findings demonstrate that decision-making is materially altered when the MSDS warnings are accompanied by real-world anecdotes describing the reality of exposure in a cleanup effort and the reality of living with health ailments believed to originate as a result of participation in such cleanup efforts. This evidence suggests both policy makers and rulemaking agencies should consider ways of facilitating access to personal anecdotes when the MSDS disclosures are required.

One possible objection to our proposal is that it will reduce the number of oil cleanup workers. Put differently, after reading the improved disclosure—including the anecdotes—some prospective workers will conclude that participating is too dangerous.

Here, another comparison to the 1933 Securities Act is in order. When FDR proposed the Act—and the attendant disclosure of risk—financial institutions pushed back, claiming it would stifle investment.<sup>208</sup> However, the

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204. See generally Robert W. Benson & Joan B. Kessler, *Legalese v. Plain English: An Empirical Study of Persuasion and Credibility in Appellate Brief Writing*, 20 LOY. L.A. L. REV. 301, 303-04 (1987); Isaac C. Hunt, Jr., *Plain English—Changing the Corporate Culture*, 51 U. MIAMI L. REV. 713, 716-17 (1997).

205. Andrew T. Serafin, *Kicking the Legalese Habit: The SEC’s “Plain English Disclosure” Proposal*, 29 LOY. U. CHI. L.J. 681, 682 (1998); Plain English Disclosure, 62 Fed. Reg. 3152, 3152 (Jan. 21, 1997).

206. Elie Dolgin, *Legalese Creates Consent ‘Conundrum’ in Clinical Trials*, 16 NATURE MED. 727 (2010) (“‘It really underscores the conundrum here,’ says [Paul Appelbaum, a psychiatrist at Columbia University,] who has studied informed consent issues for decades. ‘We rely on consent forms to inform subjects, yet the more complete we are, the less likely they will be to read and understand the forms we rely on.’ Laura Beskow, health policy researcher at the Duke Institute for Genome Sciences and Policy in Durham, North Carolina, agrees, ‘It undermines the whole process of informed consent if people aren’t reading the thing, let alone comprehending it.’”).

207. See Christopher R. Trudeau, *The Public Speaks: An Empirical Study of Legal Communication*, 14 SCRIBES J. LEG. WRITING 121, 149-50 (2011-2012) (providing evidence that individuals prefer legal terms be accompanied by non-legalese explanations).

208. JOEL SELIGMAN, *THE TRANSFORMATION OF WALL STREET 77-79* (2003).



opposite proved to be true. Passage of the Act increased investor protections, investor confidence, and the willingness of investors to participate in the public markets.<sup>209</sup> In the years immediately following the passage of the Act, offerings actually increased.<sup>210</sup>

Likewise, in this case, while fewer persons may volunteer in the short-term, providing more transparency and greater access to information will likely increase worker protections, worker confidence, and willingness to serve as an oil spill cleanup worker in the medium- to long-term.

## CONCLUSION

This research study provides statistical evidence that current disclosure requirements, as measured through the MSDS, do not fully inform individuals of the material risk they may encounter when engaging in cleanup efforts after oil spills. By analogizing “materiality” disclosure requirements from Securities Law to hazardous material exposure requirements, we argue that information beyond that provided in the current MSDS should be provided to individuals who may come into contact with oil spills. Our results show that personal anecdotes can be statistically significantly meaningful to decision-makers in assessing their willingness to participate in cleanup efforts and the wages they will demand for their participation. Given these findings, there may be value in requiring firms to include a random sample of such commentary along with any MSDS disclosure materials as part of general practice. We encourage agencies within the Federal Government to consider improvements to its disclosure requirements in accordance with these findings.

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209. “In his comprehensive history of federal securities regulation, Professor Joel Seligman notes that several SEC and academic studies indicate that mandatory disclosure provisions of the 1933 and 1934 Acts reduced underwriter costs and that the disclosure programs increased investor confidence and led directly to a large increase in investor participation in the stock markets.” Robert Prentice, *Whither Securities Regulation? Some Behavioral Observations Regarding Proposals for Its Future*, 51 DUKE L.J. 1397, 1419-20 (2002) (quoting SELIGMAN, *supra* note 208, at 561-62); see Frank H. Easterbrook & Daniel R. Fischel, *Mandatory Disclosure and the Protection of Investors*, 70 VA. L. REV. 669, 692-93 (1984) (discussing the increase in confidence after the Securities Act of 1933).

210. BUREAU OF ECON. ANALYSIS, U.S. DEP’T COMMERCE, SURVEY OF CURRENT BUSINESS 35 (1938) (showing a continuing increase in stock issuances by 1938).

## APPENDIX A



## SAFETY DATA SHEET

APPENDIX 1

PRODUCT

COREXIT(R) EC9527A

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

**1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

PRODUCT NAME : COREXIT(R) EC9527A

APPLICATION : OIL SPILL DISPERSANT

COMPANY IDENTIFICATION : Nalco Company  
1601 W. Diehl Road  
Naperville, Illinois  
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING  
HEALTH : 2 / 2 FLAMMABILITY : 1 / 1 INSTABILITY : 0 / 0 OTHER :  
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme

**2. COMPOSITION/INFORMATION ON INGREDIENTS**

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
2-Butoxyethanol	111-76-2	30.0 - 60.0
Organic sulfonic acid salt	Proprietary	10.0 - 30.0
Propylene Glycol	57-55-6	1.0 - 5.0

**3. HAZARDS IDENTIFICATION****\*\*EMERGENCY OVERVIEW\*\*****WARNING**

Eye and skin irritant. Repeated or excessive exposure to butoxyethanol may cause injury to red blood cells (hemolysis), kidney or the liver. Harmful by inhalation, in contact with skin and if swallowed.  
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Wear suitable protective clothing. Keep container tightly closed. Flush affected area with water. Keep away from heat. Keep away from sources of ignition - No smoking.  
May evolve oxides of carbon (COx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :  
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :  
Can cause moderate irritation.

Nalco Company 1601 W. Diehl Road • Naperville, Illinois 60563-1198 • (630)305-1000

For additional copies of an MSDS visit [www.nalco.com](http://www.nalco.com) and request access

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**SAFETY DATA SHEET**

PRODUCT

**COREXIT(R) EC9527A**

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

**SKIN CONTACT :**

Can cause moderate irritation. Harmful if absorbed through skin.

**INGESTION :**

May be harmful if swallowed. May cause liver and kidney effects and/or damage. There may be irritation to the gastro-intestinal tract.

**INHALATION :**

Harmful by inhalation. Repeated or prolonged exposure may irritate the respiratory tract.

**SYMPTOMS OF EXPOSURE :****Acute :**

Excessive exposure may cause central nervous system effects, nausea, vomiting, anesthetic or narcotic effects.

**Chronic :**

Repeated or excessive exposure to butoxyethanol may cause injury to red blood cells (hemolysis), kidney or the liver.

**AGGRAVATION OF EXISTING CONDITIONS :**

Skin contact may aggravate an existing dermatitis condition.

**HUMAN HEALTH HAZARDS - CHRONIC :**

Contains ethylene glycol monobutyl ether (butoxyethanol). Prolonged and/or repeated exposure through inhalation or extensive skin contact with EGBE may result in damage to the blood and kidneys.

**4. FIRST AID MEASURES****EYE CONTACT :**

Flush affected area with water. Get medical attention.

**SKIN CONTACT :**

Flush affected area with water. Get medical attention.

**INGESTION :**

Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink. Get medical attention.

**INHALATION :**

Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

**NOTE TO PHYSICIAN :**

Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

**5. FIRE FIGHTING MEASURES****FLASH POINT :**

163 °F / 72.7 °C ( TCC )

This product does not sustain combustion per the method outlined in 49 CFR Appendix H.

Nalco Company 1601 W. Diehl Road • Naperville, Illinois 60563-1198 • (630)305-1000

For additional copies of an MSDS visit [www.nalco.com](http://www.nalco.com) and request access

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**SAFETY DATA SHEET**

PRODUCT

**COREXIT(R) EC9527A**

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

**EXTINGUISHING MEDIA :**

This product would not be expected to burn unless all the water is boiled away. The remaining organics may be ignitable. Use extinguishing media appropriate for surrounding fire.

**FIRE AND EXPLOSION HAZARD :**

May evolve oxides of carbon (COx) under fire conditions.

**SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :**

In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

**6. ACCIDENTAL RELEASE MEASURES****PERSONAL PRECAUTIONS :**

Restrict access to area as appropriate until clean-up operations are complete. Stop or reduce any leaks if it is safe to do so. Do not touch spilled material. Ventilate spill area if possible. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection).

**METHODS FOR CLEANING UP :**

**SMALL SPILLS:** Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. **LARGE SPILLS:** Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

**ENVIRONMENTAL PRECAUTIONS :**

Do not contaminate surface water.

**7. HANDLING AND STORAGE****HANDLING :**

Avoid eye and skin contact. Do not take internally. Ensure all containers are labeled. Keep the containers closed when not in use.

**STORAGE CONDITIONS :**

Store the containers tightly closed.

**SUITABLE CONSTRUCTION MATERIAL :**

Stainless Steel 316L, Hastelloy C-276, MDPE (medium density polyethylene), Nitrile, Plexiglass, Kalrez, TFE, Alfax, Teflon, HDPE (high density polyethylene), Neoprene, Aluminum, Polypropylene, Polyethylene, Carbon Steel C1018, Stainless Steel 304, Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use., FEP (encapsulated), Perfluoroelastomer, PVC

**UNSUITABLE CONSTRUCTION MATERIAL :**

Copper, Mild steel, Brass, Nylon, Buna-N, Natural rubber, Polyurethane, Hypalon, Viton, Ethylene propylene, EPDM

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**8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

## OCCUPATIONAL EXPOSURE LIMITS :

Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below.

## ACGIH/TLV :

Substance(s)

2-Butoxyethanol TWA: 20 ppm , 97 mg/m3

Propylene Glycol

OSHA/PEL :

Substance(s)

2-Butoxyethanol TWA: 50 ppm , 240 mg/m3 (Skin)

Propylene Glycol

AIHA/WEEL :

Substance(s)

For propylene glycol, an 8 hour TWA of 10 mg/m3 (aerosol) and 50 ppm (total).

## ENGINEERING MEASURES :

General ventilation is recommended.

## RESPIRATORY PROTECTION :

Where concentrations in air may exceed the limits given in this section, the use of a half face filter mask or air supplied breathing apparatus is recommended. A suitable filter material depends on the amount and type of chemicals being handled. Consider the use of filter type: Multi-contaminant cartridge, with a Particulate pre-filter. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

## HAND PROTECTION :

Neoprene gloves, Nitrile gloves, Butyl gloves, PVC gloves

## SKIN PROTECTION :

Wear standard protective clothing.

## EYE PROTECTION :

Wear chemical splash goggles.

## HYGIENE RECOMMENDATIONS :

Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse.

## HUMAN EXPOSURE CHARACTERIZATION :

Based on our recommended product application and personal protective equipment, the potential human exposure is: Low

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**9. PHYSICAL AND CHEMICAL PROPERTIES**

PHYSICAL STATE	Liquid
APPEARANCE	Clear Amber
ODOR	Mild
SPECIFIC GRAVITY	0.98 - 1.02
DENSITY	8.2 - 8.5 lb/gal
SOLUBILITY IN WATER	Complete
pH (100 %)	6.1
VISCOSITY	160 cst @ 32 °F / 0 °C
POUR POINT	ASTM D-97 -66.9 °F / -55 °C
POUR POINT	< -40 °F / < -40 °C
BOILING POINT	340 °F / 171 °C
VAPOR PRESSURE	< 5 mm Hg @ 100 °F / 38 °C Same as water
EVAPORATION RATE	0.1

Note: These physical properties are typical values for this product and are subject to change.

**10. STABILITY AND REACTIVITY**

## STABILITY :

Stable under normal conditions.

## HAZARDOUS POLYMERIZATION :

Hazardous polymerization will not occur.

## CONDITIONS TO AVOID :

Extremes of temperature

## MATERIALS TO AVOID :

Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors.

## HAZARDOUS DECOMPOSITION PRODUCTS :

Under fire conditions: Oxides of carbon

**11. TOXICOLOGICAL INFORMATION**

No toxicity studies have been conducted on this product.

## SENSITIZATION :

This product is not expected to be a sensitizer.

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## CARCINOGENICITY :

None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

## HUMAN HAZARD CHARACTERIZATION :

Based on our hazard characterization, the potential human hazard is: High

**12. ECOLOGICAL INFORMATION**

## ECOTOXICOLOGICAL EFFECTS :

No toxicity studies have been conducted on this product.

## ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Turbot	96 hrs	50 mg/l	

## MOBILITY :

The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.

If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	10 - 30%	70 - 90%

The portion in water is expected to be soluble or dispersible.

## BIOACCUMULATION POTENTIAL

Component substances have a low potential to bioconcentrate.

## ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION

Based on our hazard characterization, the potential environmental hazard is: Moderate

Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Low

If released into the environment, see CERCLA/SUPERFUND in Section 15.

**13. DISPOSAL CONSIDERATIONS**

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

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As a non-hazardous waste, it is not subject to federal regulation. Consult state or local regulation for any additional handling, treatment or disposal requirements. For disposal, contact a properly licensed waste treatment, storage, disposal or recycling facility.

**14. TRANSPORT INFORMATION**

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

## LAND TRANSPORT :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

## AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

## MARINE TRANSPORT (IMDG/IIMO) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

**15. REGULATORY INFORMATION**

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

## NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :  
Based on our hazard evaluation, none of the substances in this product are hazardous.

CERCLA/SUPERFUND, 40 CFR 117, 302 :  
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :  
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.





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SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :  
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
X	Delayed (Chronic) Health Hazard
X	Fire Hazard
	Sudden Release of Pressure Hazard
	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

## SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :

This product contains the following substance(s), (with CAS # and % range) which appear(s) on the List of Toxic Chemicals

<u>Hazardous Substance(s)</u>	<u>CAS NO</u>	<u>% (w/w)</u>
Glycol Ethers		30 - 60

## TOXIC SUBSTANCES CONTROL ACT (TSCA) :

The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :

None of the substances are specifically listed in the regulation.

CLEAN AIR ACT, Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :

None of the substances are specifically listed in the regulation.

## CALIFORNIA PROPOSITION 65 :

This product does not contain substances which require warning under California Proposition 65.

## MICHIGAN CRITICAL MATERIALS :

None of the substances are specifically listed in the regulation.

## STATE RIGHT TO KNOW LAWS :

The following substances are disclosed for compliance with State Right to Know Laws:

2-Butoxyethanol	111-76-2
Propylene Glycol	57-55-6

## NATIONAL REGULATIONS, CANADA :

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**WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :**

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

**WHMIS CLASSIFICATION :**

D2B - Materials Causing Other Toxic Effects - Toxic Material

**CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :**

The substances in this preparation are listed on the Domestic Substances List (DSL), are exempt, or have been reported in accordance with the New Substances Notification Regulations.

**AUSTRALIA**

All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

**CHINA**

All substances in this product comply with the Chemical Control Law and are listed on the Inventory of Existing Chemical Substances China (IECSC).

**EUROPE**

The substance(s) in this preparation are included in or exempted from the EINECS or ELINCS inventories

**JAPAN**

All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Ministry of International Trade & Industry List (MITI).

**KOREA**

All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

**PHILIPPINES**

All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

**16. OTHER INFORMATION**

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

\* The human risk is: Low

\* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

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This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

## REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight™™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS™™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS™™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight™™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS™™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight™™ (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight™™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS™™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department  
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## APPENDIX B

*Environmental Anecdotes (Sample A: Risk Rating | Willingness to Participate in Cleanup Rating)*

1. “I wore rain gear, the same rain gear day after day, and it was totally dripping with oil smudges. After the first week, I ran out of clothes that didn’t have oil on them. The bags sat on the deck in the sun for a few days before a bigger boat would offload them to take to incinerators. The bags stank. It was pretty messy work.” (Risk: 5.38 | Willingness: 2.85)
2. “There is no risk of adverse health effects from breathing the air. Risks are greatest to workers heavily exposed to oil during some cleanup activities, but the risk to these workers is considered to be low and with appropriate training and personal protective equipment as required by the hazardous waste regulations, cleanup activities can continue and workers can be confident that their health will not be compromised.” (Risk: 4.62 | Willingness: 4.04)
3. “We were promised respirator masks. The hoses splash oil on your face....” (Risk: 6.50 | Willingness: 2.00)
4. “We tried respirators for a while, but we couldn’t—couldn’t get enough... We ran out . . . in a couple of weeks totally. The suppliers couldn’t keep up on gloves and respirators.” (Risk: 6.36 | Willingness: 1.88)
5. “A world of constant falls, slips. The oil was unbelievable. You were just constantly on your knees. Every time you fell, you had to crawl in it. You had it all over you.” (Risk: 6.04 | Willingness: 2.68)
6. “On sunny days, the rain gear was like being in a sauna. The beach crews stripped by noon, operating the sprayers in just underwear, coveralls, and life jacket.” (Risk: 5.27 | Willingness: 3.08)
7. “I tried taping my rain jacket cuffs to my gloves and my pants’ legs to my boots to reduce my oil exposure, but the oil just ate away at the tape and the edges got open. I was constantly wet from rain, spraying, or splashing.” (Risk: 5.60 | Willingness: 2.84)
8. “Oil was everywhere, and every single day, I would get covered with it... When I got done loading a boom, there’d be a foot of oil in the bottom of my boat, and I’d just shovel it out. You’d drink sodas that had oil on it, you’d smoke a cigarette, it had oil on it, if you ate a sandwich, it had oil on it.” (Risk: 6.13 | Willingness: 2.25)
9. “That stuff would eat the seals on the backpacks. Essentially, you’d be spraying and it would be running down your back and neck. You’d be coated with it. We were told there was absolutely nothing to worry about. I took their word for it.” (Risk: 5.96 | Willingness: 2.58)

10. “The rocks were slippery and sharp — a world of constant falls, slips. The oil was unbelievable. You were just constantly on your knees. Every time you fell, you had to crawl in it. You had it all over you.” (Risk: 5.85 | 2.88)

*Health Anecdotes (Sample A: Risk Rating | Willingness to Participate in Cleanup Rating)*

1. “I worked for only two months before I was incapacitated by coughing, wheezing, and shortness of breath, caused, I felt, by the diesel fumes from a nearby generator and from the oily spray that daily misted my operator’s cab. When my health problems didn’t clear up after I quit the cleanup, I went to doctors who told me my lungs had been permanently damaged by chemical exposure and that I was at risk of developing cancer.” (Risk: 6.88 | Willingness: 1.42)
2. “I cried some nights because of the terrible pain in my hands. My fingernails started to rot and disintegrate, and my wrists and forearms became swollen, so badly one day that I couldn’t open doors or dress myself.” (Risk: 6.42 | Willingness: 2.00)
3. “Traffic exhaust and cigar or cigarette smoke give me headaches and make me nauseous. Modified air—either air conditioning or heat—causes headaches and sore throats, and it dries my sinuses, making them crack and bleed. Strong cleaning solvents make me cough, choke, and nauseous, and give me headaches. The odor from a rubber slipper shop caused me to throw up. I have to choose cosmetics carefully as even some of the non-hypoallergenic ones cause rashes.” (Risk: 6.00 | Willingness: 2.54)
4. “I lost nearly 60 percent of the bone mass—the calcium—in my jaw and three teeth had to be pulled out.” (Risk: 6.58 | Willingness: 1.88)
5. “I was diagnosed with calcium breakdown and blood disorders including hypocalcemia (too little calcium in the blood) and polycythemia (high white blood count and low red blood count). I was also diagnosed with central nervous system symptoms including seizures, severe depression, acute anxiety, loss of balance, blurred vision, memory loss, severe migraine headaches, night sweats, and hot flashes.” (Risk: 6.19 | Willingness: 1.88)
6. “I just kept getting sicker and sicker. Breathing and sinus, stomach, everything.... My goodness. This thing has ruined my life.” (Risk: 6.24 | Willingness: 1.88)
7. “When I went out there, I was totally, 100% healthy. Since the cleanup, I’ve been in the hospital 58 times. I’ve had pancreatitis, liver problems, spleen problems. I had a pancreas attack, I went into septic shock and finally my body shut down. I was in a coma for 52 days,

and after that I had to learn all over again how to walk, read and talk.”  
(Risk: 6.58 | Willingness: 2.04)

8. “I was diagnosed with diabetes, along with emphysema, asthma and an enlarged liver. I have a bacterial overgrowth in my lower intestine.”  
(Risk: 6.25 | Willingness: 2.13)
9. “I noticed a change in my health a year after I worked on the spill. I had trouble remembering simple things and was constantly tired, conditions that have worsened over the years.” (Risk: 6.58 | Willingness: 1.73)
10. “Respiratory system illnesses are nearly twenty-one times higher among cleanup workers compared to the general workforce; digestive system problems are fourteen times higher; and nervous system illnesses are double the norm.” (Risk: 6.46 | Willingness: 1.96)