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Dispersants: The Lesser Of Two Evils Or A Cure Worse Than The Disease?

Catherine Kilduff

Jaclyn Lopez

DISPERSANTS: THE LESSER OF TWO EVILS OR A CURE WORSE THAN THE DISEASE?

Catherine Kilduff and Jaclyn Lopez[*]

I. INTRODUCTION

The April 20, 2010, BP oil spill is widely regarded as the nation's worst environmental disaster. The explosion of the *Deepwater Horizon* oil rig resulted in the death of eleven crewmen, and thousands of fish, sea turtles, birds, and marine mammals.[1] The federal government estimates that 4.9 million barrels (or 205.8 million gallons) of oil spilled into the Gulf of Mexico from the rogue well.[2] In addition to the direct effect on wildlife from the spilled oil, which includes reduced ability to regulate temperature, forage, and nest, the unprecedented application of dispersants also likely impacted wildlife. During the oil spill, BP released roughly 1.84 million gallons of dispersants into the Gulf, 1.07 million gallons to the surface and 771,000 subsea.[3] The Environmental Protection Agency (EPA) approved these measures despite its admission that no one fully knew the environmental effects of the dispersants,

* Catherine Kilduff and Jaclyn Lopez are staff attorneys at the Center for Biological Diversity and contributed equally to this article.

1. *See generally* Nat'l Oceanic & Atmospheric Admin., *Deepwater Horizon Response Consolidated Fish and Wildlife Collection Report*, NOAA DEEPWATER HORIZON ARCHIVE, http://www.noaa.gov/deepwaterhorizon/wildlife/index.html (last visited Mar. 4, 2011) (providing cumulative data on wildlife affected by the *Deepwater Horizon* oil spill from May 2010 to November 2010).

2. Press Release, Dep't of the Interior, U.S. Scientific Teams Refine Estimates of Oil Flow from BP's Well Prior to Capping (Aug. 2, 2010), *available at* http://www.doi.gov/news/pressreleases/US-Scientific-Teams-Refine-Estimates-of-Oil-Flow-from-BP-Well-Prior-to-Capping.cfm.

3. NAT'L COMM'N ON THE BP DEEPWATER HORIZON OIL SPILL AND OFFSHORE DRILLING, THE USE OF SURFACE AND SUBSEA DISPERSANTS DURING THE BP DEEPWATER HORIZON OIL SPILL, STAFF WORKING PAPER NO. 4, 12 (2011), *available at* http://www.oilspillcommission.gov/document/use-surface-and-subsea-dispersants-during-bp-deepwater-horizon-oil-spill [hereinafter STAFF WORKING PAPER NO. 4].

particularly at such great depths or volumes.[4] Lisa Jackson, EPA administrator, called her decision to approve BP's subsea dispersant use the hardest decision she ever made.[5]

As days turned to weeks and the oil continued to spill, it became obvious that both BP and the government were woefully unprepared to respond to a spill of this magnitude.[6] The horror and chaos of the oil spill put the government in the awkward position of leading the efforts to respond to the spill while relying on industry resources and expertise.[7] This also resulted in a tug-of-war within the Obama Administration between its enforcement and regulation roles and its need to cooperate with BP in order to stop the flow of oil and recover from the spill.[8] The use of subsea dispersants most clearly exemplified this conflict as the government's lack of knowledge about the effects of dispersants made it almost impossible for it to fulfill its legal duty to protect the nation's waters and wildlife from pollutants.

Two U.S. federal laws, the Clean Water Act (CWA)[9] and the Endangered Species Act (ESA),[10] contain provisions that specifically ensure that dispersant approval and use will not jeopardize imperiled wildlife and the resources on which they depend. In light of the general lack of knowledge regarding the effects of dispersants used in response to the *Deepwater Horizon* oil spill, and the harm they may have caused, it has become evident that these two environmental laws, their implementation, or both, were inadequate to safeguard the environment and wildlife from the disaster response.

This Article examines the use of dispersants in response to the BP oil spill. The authors describe the ways in which the CWA and the ESA

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4. *Id.* at 1-2, 4.

5. Jeff Goodell, *The Poisoning*, ROLLING STONE, July 21, 2010, http://www.rollingstone.com/politics/news/the-poisoning-20100721.

6. *See* NAT'L COMM'N ON THE BP DEEPWATER HORIZON OIL SPILL AND OFFSHORE DRILLING, DEEP WATER: THE GULF OIL DISASTER AND THE FUTURE OF OFFSHORE DRILLING 182 (2011), *available at* http://www.oilspillcommission.gov/sites/default/files/documents/DEEPWATER_ReporttothePresident_FINAL.pdf [hereinafter FINAL REPORT].

7. *Id.* at 134-35 (noting that while the Coast Guard has the option under 40 C.F.R. § 300.305(d) to "federalize" the spill—conducting and funding all aspects of the response and later seeking reimbursement from the responsible party—the Coast Guard preferred to view BP as a "co-combatant in the fight against the oil").

8. *Id.* at 136 ("Though the Coast Guard and MMS believed they had to work closely with BP, others in government did not share this view of the relationship with the responsible party.").

9. 33 U.S.C. §§ 1251-1381 (2006).

10. 16 U.S.C. §§ 1531-1544 (2007).

authorize the EPA to regulate the use of dispersants and suggest how the regulation of dispersants could be strengthened. Part II discusses the development of contingency plans for oil spills in the Gulf of Mexico and the pre-spill consultation process for dispersants' effects on wildlife. Part III describes BP's dispersant use in response to the *Deepwater Horizon* oil spill and recent scientific research identifying potential effects on the ocean and marine wildlife. Part IV discusses lessons learned from the oil spill and concludes that future preparedness will require better agency implementation or even legislative action.

II. STATUTORY FRAMEWORK FOR REGULATING DISPERSANTS: THE CLEAN WATER ACT AND THE ENDANGERED SPECIES ACT

A. The Clean Water Act

With respect to the use of dispersants, the CWA has seemingly conflicting mandates. The CWA prohibits the discharge of pollutants into navigable waters,[11] but also authorizes the President to allow the application of dispersants to water in the event of an oil spill.[12] The broad authority that the CWA provides for the mitigation of oil spills is a testament to the devastation the spills can cause. This authority, however, is not completely unfettered; the CWA requires prior planning for dispersant use. Response activities must be conducted pursuant to a National Contingency Plan (NCP), and the EPA is charged with listing dispersants on the NCP Product Schedule as part of its preparation of the NCP.[13] While the listing of a dispersant on the schedule does not constitute EPA's approval of the product for use on an oil spill,[14] it is a prerequisite that makes the product lawfully available for use in oil spill response activities.[15]

B. Listing Dispersants on the Product Schedule

EPA regulations require that a dispersant product on the schedule be at least 45 percent effective, and that the toxicity testing results factor

11. 33 U.S.C. § 1321(b)(3) (2006); *see also* 40 C.F.R. § 110.3 (2010) (defining harmful discharges under the Act).

12. *See* 33 U.S.C. § 1321(c)-(d).

13. *Id.* § 1321(d); *see also* 40 C.F.R. § 300.905(a) (regulations requiring NCP Product Schedule).

14. 40 C.F.R. § 300.920(e).

15. 33 U.S.C. § 1321(d)(2)(G).

into the product's effectiveness value.[16] The toxicity testing is not intended to estimate the dispersant's ecosystem effects, but merely tests for acute toxicity within forty-eight and ninety-six hours.[17] The tests do not consider environmental persistence, effectiveness with multiple varieties of oil and at multiple temperatures, byproducts, or endocrine effects.[18] While the industry is responsible for toxicity testing, the EPA retains the right to conduct its own testing to verify industry results and to weigh EPA testing results in determining whether the product meets listing criteria.[19]

The EPA currently lists fifteen dispersants on the NCP Product Schedule, two of which belong to the Corexit brand and are the two dispersants BP used most heavily in response to its oil spill.[20] Corexit 9500 was listed on April 13, 1994, and was relisted on December 18, 1995, under the name Corexit 9500A.[21] Corexit 9527 was listed on March 10, 1978, and was relisted on December 18, 1995, and is now listed under the name Corexit EC9527A.[22] The EPA's NCP Product Schedule guide indicates that Corexit 9500A and 9527A are most appropriate for surface application and have an average effectiveness rate of around 50 percent.[23] It also recommends the application volume for Corexit 9500A and 9527A is two to ten gallons per acre.[24]

C. Contingency Plans for the Gulf of Mexico

The NCP also requires the development of Area Contingency Plans (ACPs), prepared by a designated "Area Committee" comprised of federal, local, and state officials and approved by the EPA and the Coast Guard.[25] In addition to ACPs, Regional Response Teams (RRTs) are

16. 40 C.F.R. §§ 300.905(a), 300.915(a)(8), 300.920, 300.920(a).

17. 40 C.F.R. pt. 300, app. C, 3.1.

18. STAFF WORKING PAPER NO. 4, *supra* note 3, at 6.

19. 40 C.F.R. § 300.920(a).

20. U.S. Envtl. Prot. Agency, *National Contingency Plan Product Schedule*, U.S. ENVTL. PROTECTION AGENCY (May 11, 2011), http://www.epa.gov/oem/docs/oil/ncp/schedule.pdf.

21. U.S. Envtl. Prot. Agency, *COREXIT® EC9500A*, U.S. ENVTL. PROTECTION AGENCY (Jan. 27, 2011), http://www.epa.gov/oem/content/ncp/products/corex950.htm.

22. U.S. Envtl. Prot. Agency, *COREXIT® EC9527A*, U.S. ENVTL. PROTECTION AGENCY (Jan. 27, 2011), http://www.epa.gov/oem/content/ncp/products/corex952.htm.

23. U.S. ENVTL. PROT. AGENCY, GUIDE TO USING THE NCP PRODUCT SCHEDULE NOTEBOOK 10-12, 20-22 (2011), *available at* http://www.epa.gov/oem/docs/oil/ncp/notebook.pdf.

24. *Id.* at 12.

25. 33 U.S.C. § 1321(j)(4).

responsible for developing and maintaining Regional Contingency Plans (RCPs).[26] The RCPs "follow the format of the NCP" and coordinate response between state emergency plans and area-specific contingency plans.[27] An RCP must be developed for each EPA region, in addition to a separate RCP for Alaska.[28] For example, the approved RCPs for EPA Region 4 (Mississippi, Alabama, and Florida) and Region 6 (including Louisiana and Texas) guided BP's dispersant use in the *Deepwater Horizon* oil spill.[29]

EPA and the Coast Guard, as co-chairs of the Region 4 RRT, approved the Regional Response Team Oil Spill Dispersant Use Policy (Region 4 Policy) in 1996.[30] The Region 4 Policy "preauthorizes limited use of dispersants by the pre-designated United States Coast Guard On-Scene Coordinator (OSC) on oil discharges impacting Federal waters and other specifically designated areas."[31] The Region 4 Policy specified that further consultation would not be required for dispersant use within pre-authorized areas so long as the appropriate RRT agencies are immediately notified and applicable protocols followed.[32] Dispersant use is pre-authorized for "green zone" areas, which are defined as offshore areas at least three miles from shore, outside state jurisdictions, where the water is at least ten meters deep.[33] In "yellow zones," the Coast Guard must request authorization from the RRT.[34] Yellow zones are waters under state or federal special management, such as wildlife refuges, National Park Service areas, or proposed or designated critical habitats; waters within three miles of shore or within state jurisdiction; or, waters less than ten meters deep.[35] Dispersant use is prohibited in "red zones" unless necessary to prevent or mitigate risk to human health or safety.[36] No red zones have been designated.[37]

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26. 40 C.F.R. § 300.210(b).
27. *Id.*
28. *Id.*
29. STAFF WORKING PAPER NO. 4, *supra* note 3, at 6.
30. REGION IV REGIONAL RESPONSE TEAM, USE OF DISPERSANTS IN REGION IV (1996).
31. U.S. Fish & Wildlife Serv. & Nat'l Marine Fisheries Serv., *Biological Assessment of Effects on Listed Species of Region IV Regional Response Team Oil Spill Dispersant Use Policy*, *in* USE OF DISPERSANTS IN REGION IV, 32, 33, 72 (1996).
32. *Id.*
33. *Id.* at 33-34.
34. *Id.* at 34.
35. *Id.*
36. *Id.* at 34-35.
37. *Id.*

Region 6 re-approved its Dispersant Pre-Approval Guidelines and Checklist (Region 6 Guidelines) on January 24, 2001.[38] The Region 6 Guidelines provide pre-approval authority to the Federal On Scene Coordinator (FOSC) for dispersant use in the U.S. Exclusive Economic Zone off the Texas and Louisiana coasts. Under the Guidelines, "[t]he only requirement for dispersant product selection is that the dispersant must be included on the NCP Product Schedule and considered appropriate by the FOSC for existing environmental and physical conditions."[39] The guidelines contemplate surface application of dispersants, setting forth pre-approval criteria for aerial spraying and surface boat spray systems.[40] While "alternative platforms" may be considered, none are specified or discussed.[41]

D. The Endangered Species Act

Congress intended that the ESA protect and conserve species from extinction. Accordingly, section 7 of the ESA requires federal agencies to engage in consultation with the Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) (collectively, the Services) to ensure that "any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize" any listed species or adversely modify critical habitat.[42] In order for an agency's action to trigger the consultation requirements of section 7(a)(2), the action must be both an affirmative action and discretionary.[43] Section 7(a)(2) typically applies

38. FEDERAL REGION VI REGIONAL RESPONSE TEAM, FOSC DISPERSANT PRE-APPROVAL GUIDELINES AND CHECKLIST 1 (2001) [hereinafter REGION VI GUIDELINES].

39. *Id.* at 1.

40. *Id.* at 2-3, 14.

41. This led to confusion during the *Deepwater Horizon* oil spill, because the EPA believed that the RRT did not preauthorize the subsea application of dispersants and wanted the ultimate approval to come from a higher level within the EPA; meanwhile the responders were left without clear communication or immediate direction from the EPA. FINAL REPORT, *supra* note 6, at 145.

42. 16 U.S.C. § 1536(a)(2).

43. "In order for section 7(a)(2) to apply, there must be discretionary federal agency action. Federal agency 'action' is defined by regulation and broadly construed by the courts to include any action in which there is some federal discretionary involvement or control. . . . [A]n agency's action must be 'affirmative'; an agency that is merely providing advice or declining to act in a certain way is generally not engaging in agency action subject to section 7." Patrick W. Ryan and Erika E. Malmen, *Interagency Consultation Under Section 7*, *in* ENDANGERED SPECIES ACT: LAW, POLICY AND PERSPECTIVES 105-106 (Donald C. Baur & Wm. Robert Irvin, eds., 2d ed. 2010); *see also* Nat'l Ass'n of Home Builders v. Defenders of Wildlife, 551 U.S. 644, 649 (2007).

to ongoing agency action as well as programmatic agency action that guides or constrains subsequent activities, so long as the challenged federal agency retains discretionary control to make decisions that could inure to the benefit of ESA-listed species and critical habitat.[44]

To fulfill this mandate, the acting agency first prepares a biological assessment to determine whether the action "may affect" a listed species, and if so, the agency must initiate consultation with either FWS or NMFS, depending on the species involved.[45] At the completion of consultation, FWS or NMFS will issue either a written statement concurring that the action is not likely to adversely affect a species, or a biological opinion that determines if the agency action is likely to jeopardize the species.[46] If jeopardy is found, the opinion must specify reasonable and prudent alternatives that will avoid jeopardy and allow the agency to proceed with the action.[47]

In 2001, the EPA and the Coast Guard entered into an Interagency Memorandum of Agreement (MOA) outlining ESA consultation procedures for preparing oil spill Contingency Plans.[48] Pursuant to the MOA, the EPA and the Coast Guard must initiate informal consultation with the Services when drafting an ACP if any endangered and threatened animal may be affected by the plan.[49] During consultation, the EPA, the Coast Guard, and the Services must identify sensitive areas and methods to avoid adverse impacts on listed wildlife.[50] If "potential adverse effects are identified and removed," the Services will provide a concurrence letter, but if not, formal ESA consultation must be undertaken.[51]

The Region 4 RRT, including the EPA and the Coast Guard, conducted biological assessments (Region 4 BA) of the effects of the Region 4 policy on species under the jurisdiction of the Services.[52]

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44. 50 C.F.R. § 402.02 (2009).

45. 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.14(a).

46. 16 U.S.C. § 1536(b)(3)(A); 50 C.F.R. § 402.14.

47. 50 C.F.R. § 402.14(h)(3).

48. *See* Memorandum of Agreement Between U.S. Envtl. Prot. Agency, U.S. Fish and Wildlife Serv., Nat'l Marine Fisheries Serv., Nat'l Ocean Serv., and Dep't of the Interior Regarding Oil Spill Planning and Response Activities Under the Fed. Water Pollution Control Act's Nat'l Oil and Hazardous Substances Pollution Contingency Plan and the Endangered Species Act (2001) [hereinafter MOA].

49. *Id.* at 5.

50. *Id.*

51. *Id.* at 6.

52. *See* U.S. FISH AND WILDLIFE SERV., NAT'L MARINE FISHERIES SERV., BIOLOGICAL ASSESSMENTS AND SECTION 7 CONSULTATION FOR THREATENED AND ENDANGERED

Notably, the assumptions made in the Region 4 BA regarding the amounts of dispersants that would be applied, the depth at which they would be applied, and the duration of wildlife and ecosystem exposure did not hold true for the *Deepwater Horizon* response. The Region 4 BA assumed that dispersants would largely be applied at the surface of the water in moderate amounts early in the spill response effort. For example, the Region 4 BA assumed that food chain effects from prey contamination were unlikely due to "low concentrations and short duration of exposure to dispersed oil."[53] The Region 4 BA also concluded that dispersants would not likely cause significant additional harm to birds or fur-bearing mammals, despite destroying their ability to insulate themselves or repel water, because "[w]ithin the normal range of operating dosages, biological effects are due to the dispersed oil, not the dispersant."[54] The Region 4 BA acknowledged that sea turtles could experience higher exposure to oil and dispersants in the water column after dispersant application, but simply assumed that "exposure will be short-term and concentrations low" due to rapid dilution.[55]

Based on these assumptions—and scant information regarding dispersant effects in general—the Region 4 BA concluded that dispersant use "under appropriate conditions" was "not likely to adversely affect listed species beyond the potential effects of the spilled oil or add to the cumulative environmental stresses currently acting on the species."[56] The document also specified that consultation "will be re-initiated if additional information not previously considered becomes available indicating adverse effects to listed species or critical habitat from the identified action."[57]

Similarly, the "Bioassessment of the Potential Impacts Resulting from Dispersant Use in Offshore Waters in the Gulf of Mexico" (Region 6 BA) findings are based on the assumption that dispersants would be applied to the surface of the ocean and at "recommended" application rates.[58] The Region 6 BA bases its evaluation of species' risk from

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SPECIES, *in* OCEAN AND COASTAL WATERS DISPERSANT USE, REGION IV REGIONAL RESPONSE TEAM 35.

53. *Id.* at 40; *see also id.* at 84.

54. *Id.* at 39.

55. *Id.* at 83.

56. *Id.* at 85-86.

57. *Id.* at 86.

58. U.S. FISH AND WILDLIFE SERV., NAT'L MARINE FISHERIES SERV., BIOASSESSMENT OF THE POTENTIAL IMPACTS RESULTING FROM DISPERSANT USE IN OFFSHORE WATERS IN THE GULF OF MEXICO, *in* RRT-6 FOSC DISPERSANT USE PRE-APPROVAL GUIDELINES AND CHECKLIST, REGIONAL RESPONSE TEAM VI, app. 5-9.

dispersant effects largely on whether the species lives at the surface or in offshore waters. For example, it assumes that sea turtles, sperm whales, and red snapper are only at "medium" risk of being directly affected by dispersant use because sea turtles were thought to have low numbers habitating offshore, and sperm whales and red snapper were thought to prefer deep water habitat.[59] The Region 6 BA found that important prey species, such as Gulf menhaden and blue crabs, had a high risk of negative impacts from dispersant use, because these organisms are found in the water column in offshore waters.[60] The Region 6 BA did not discuss particular impacts to sea turtles or marine mammals, relying instead on a 1994 statement by NMFS, made in response to a request for ESA consultation, that "the species under our purview are not likely to be adversely affected by the use of chemical countermeasures in response to an oil spill."[61] The Region 6 BA also discounted the likelihood that dispersants could adversely affect birds.[62]

The MOA authorizes emergency ESA consultations, pursuant to 50 C.F.R. § 402.05, for oil spill response activities.[63] When listed species or critical habitat are, or could be, present in the area affected by the spill, the FOSC designated under the NCP must initiate emergency ESA consultation by contacting the Services.[64] The NOAA regional response coordinator and scientific support coordinator are tasked with coordinating species expertise, which may involve participation by Services staff from local field offices as well as Services participation in the FOSC Incident Command System.[65]

PART III: THE IMPACTS OF DISPERSANTS ON WILDLIFE

A. The Use of Dispersants in Response to the BP Oil Spill

Dispersants are one of several tools authorized for use in response to oil spills. However, the use of dispersants in response to the BP oil spill was in sharp contrast in methodology, scale, and scope to anything the EPA or Coast Guard had envisioned or considered in the past. In the first few weeks of the oil spill, the federal government simply deferred to BP's choice of dispersants and their use. Indeed, on May 10, the EPA

59. *Id.* at app. 7.
60. *Id.* at app. 8.
61. *Id.* at app. 13.
62. *Id.* at app. 13-14.
63. MOA, *supra* note 48, at 7; *see also* 50 C.F.R. § 402.05.
64. MOA, *supra* note 48, at 7.
65. *Id.*

issued BP a directive essentially authorizing what amounted to a large-scale scientific experiment in the Gulf of Mexico, under which BP was required to determine that subsurface dispersant application was chemically breaking up the oil and then to sample and delineate the dispersed plume.[66] The directive also called for BP to consult the RRT if dissolved oxygen near the plume fell below 2 mg/L or if toxicity tests revealed "excessive exertion of a toxic response."[67] David Valentine, a geomicrobiologist at the University of California, Santa Barbara, described BP's use of dispersants as "an experiment that's never been performed before—to dump that much of an industrial chemical into the ocean."[68]

BP's early reports failed to satisfy the EPA's requirements, and toxicity tests soon revealed that the Corexit dispersants had potential to kill up to 25 percent of organisms living five hundred feet below the surface in areas where the dispersants were used.[69] The EPA Product Schedule ranked Corexit 9500A and 9527A as more toxic and less effective than other EPA-approved dispersants for use on Louisiana Sweet Crude (LSC), the type of oil that spewed from BP's broken well.[70] These dispersants are known toxins to wildlife. Corexit 9527A contains 2-butoxyethanol, which ruptures red blood cells, and in high, yet realistic concentrations, can be more toxic than crude oil alone.[71] Notably, BP

66. U.S. ENVTL. PROT. AGENCY, DISPERSANT MONITORING AND ASSESSMENT DIRECTIVE FOR SUBSURFACE DISPERSANT APPLICATION 1 (May 10, 2010).

67. *Id.* at 3.

68. Amanda Mascarelli, *Debate Grows Over Impact of Dispersed Oil*, NATURE, July 10, 2010, http://www.nature.com/news/2010/100710/full/news.2010.347.html.

69. Matt Gutman, Lee Farren & Bradley Blackburn, *EPA May Not Force BP to Change Dispersants*, ABC NEWS, May 21, 2010, http://abcnews.go.com/WN/epz-bp-dispersants/story?id=10711367; BP SAMPLING RESULTS (IN VARIOUS FORMATS) FROM MAY 15 TO AUGUST 31, BP'S ANALYSIS OF SUBSURFACE DISPERSANT USE, U.S. ENVTL. PROTECTION AGENCY, http://www.epa.gov/bpspill/dispersants-bp.html (last updated Jan. 10, 2011) (showing 75 percent rotifer survival at 500 feet on May 15, 2010).

70. *National Contingency Plan Product Schedule Toxicity and Effectiveness Summaries*, U.S. ENVTL. PROTECTION AGENCY, http://www.epa.gov/emergencies/content/ncp/tox_tables.htm (last updated Mar. 30, 2011).

71. *See, e.g.*, Peter H. Albers, *Effects of Corexit 9527 on the Hatchability of Mallard Eggs*, 23 BULLETIN OF ENVTL. CONTAMINATION AND TOXICOLOGY 661 (1979); S. Bhattacharya et al., *Toxicity to Freshwater Organisms from Oils and Oil Spills Chemical Treatments in Laboratory Microcosms*, 122 ENVTL. POLLUTION 122, 205 (2003); Mace G. Barron et al., 2003, *Photoenhanced Toxicity of Aqueous Phase and Chemically Dispersed Weathered Alaska North Slope Crude Oil to Pacific Herring Eggs and Larvae*, 22 ENVTL. TOXICOLOGY AND CHEMISTRY, 650 (2003); Ruth I. Ibemesim & Joseph F. Bamidele, *Comparative Toxicity of Two Oil Types and Two Dispersants on the Growth of a*

stopped using Corexit 9527A early in the response because of alleged health effects on workers in the *Exxon-Valdez* response.[72] Multiple studies on the effects of Corexit 9500A have concluded that its use increased the exposure of fish to the polycyclic aromatic hydrocarbons (PAHs) found in crude oil.[73]

One of the many complaints about Corexit was that "[w]e already know that dispersants are less toxic than oil if you compare the two. . . . [b]ut because Corexit contains a petroleum solvent, we're actually putting petroleum solvent on top of a petroleum spill. So it's increasing the hydrocarbons in the water column."[74] Dispersants can release toxic break-down products, such as PAHs from oil, which can make dispersed oil even more harmful than oil left untreated.[75] Furthermore, these dispersants can actually facilitate the entry of oil into the body of

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Seashore Grass, Paspalum vaginatum, 2008 INT'L OIL SPILL CONFERENCE 875 (2008); R.A. Khan & J.F. Payne, *Influence of a Crude Oil Dispersant, Corexit 9527, and Dispersed Oil on Capelin (Mallotus villosus), Atlantic cod (Gadus morhua), Longhorn sculpin (Myoxocephalus octodecemspinosus), and cunner (Tautogolabrus adspersus)*, 75 BULLETIN OF ENVTL.. CONTAMINATION AND TOXICOLOGY 50 (2005); Ismail Gulec & Douglas A. Holdway, *Toxicity of Dispersant, Oil and Dispersed Oil to Two Marine Organisms*, 1997 INTERNATIONAL OIL SPILL CONFERENCE 1010 (1997); Alexander A. Venn et al., *P-glycoprotein (Multi-xenobiotic Resistance) and Heat Shock Protein Gene Expression in the Reef Coral Montastraea franksi in Response to Environmental Toxicants*, 93 AQUATIC TOXICOLOGY 188 (2009).

72. STAFF WORKING PAPER NO. 4, *supra* note 3, at 8.

73. *See generally* Shahunthala D. Ramachandran et al., *Oil Dispersant Increases PAH Uptake by Fish Exposed to Crude Oil*, 59 ECOTOXICOLOGY AND ENVTL. SAFETY 300 (2004); Brian S. Anderson et al., *Preliminary Investigation of the Effects of Dispersed Prudhoe Bay Crude Oil on Developing Topsmelt Embryos, Atherinops affinis*, 157 ENVTL. POLLUTION 1058 (2009); Stephen McIntosh et al.,, *Toxicity of Dispersed Weathered Crude Oil to Early Life Stages of Atlantic Herring (Clupea harengus), 29* ENVTL. TOXICOLOGY AND CHEMISTRY 1160 (2010).

74. SUSAN D. SHAW, CONSENSUS STATEMENT: SCIENTISTS OPPOSE THE USE OF DISPERSANT CHEMICALS IN THE GULF OF MEXICO 4, MARINE ENVTL. RESEARCH INST. (2010), *available at* http://www.nature.com/news/2010/100710/full/news.2010.347.html.

75. *See generally* Catherine M. Couillard et al., *Effect of Dispersant on the Composition of the Water-Accommodated Fraction of Crude Oil and its Toxicity to Larval Marine Fish*, 24 ENVTL. TOXICOLOGY AND CHEMISTRY 1496 (2005); Mihoko Yamada et al., *Study on the Fate of Petroleum-derived Polycyclic Aromatic Hydrocarbons (PAHs) and the Effect of Chemical Dispersant Using an Enclosed Ecosystem, Mesocosm*, 47 MARINE POLLUTION BULLETIN 105 (2003); A.A. Otitoloju, *Evaluation of Crude Oil Degradation Under a no-control and Dispersant-Control Settings, Based on Biological and Physical Techniques*, 4 INT'L J. OF ENVTL. RESEARCH 353 (2010).

animals.[76] In addition, the ingredients in the Corexit dispersants were not initially disclosed; instead, ingredients were listed in a group rather than as a single chemical.[77] Scientists were concerned that without knowing the actual ingredients, it would not be possible to truly asses the human health or environmental effects.[78] Eventually Nalco, the company that manufactures Corexit, caved to public pressure and disclosed Corexit's ingredients.[79]

Despite these concerns, on May 15, 2010, the EPA authorized BP to use dispersants sub-surface at the wellhead under the premise that by injecting dispersants at the source of the oil, less dispersants would be needed.[80] Five days later, under pressure from an outraged public and concerned scientific experts, the EPA issued an addendum to its directive giving BP twenty hours to identify more effective and less toxic dispersants on the Product Schedule.[81] Just one day earlier, BP had applied 70,000 gallons of dispersants in a single day.[82] However, BP refused to use other dispersants claiming that they were either more environmentally damaging or not available in sufficient quantity.[83]

One week later, the EPA directed BP to reduce dispersant use by 75 percent from daily peak use by eliminating surface application and limiting subsurface application to 15,000 gallons per day.[84] The EPA reports that over the next month, BP reduced its dispersant use 68

76. KATHLEEN BURNS & MICHAEL R. HARBUT, SCIENCECORPS, GULF OIL SPILL HAZARDS 14 (2010), *available at* http://www.sciencecorps.org/Gulf_Spill_Chemical_Hazards_Report.pdf.

77. SHAW, *supra* note 74, at 3.

78. *Id.*

79. *See* Nalco, *Corexit Ingredients*, NALCO NORTH AMERICA, http://www.nalco.com/news-and-events/4297.htm (last visited Mar. 19, 2011).

80. U.S. Envtl. Prot. Agency, *Coast Guard and EPA Approve Use of Dispersant Subsea in Further Effort to Prevent Oil from Reaching U.S. Shoreline / Agencies Reserve Authority to Stop the Use of the Dispersant At Any Time*, U.S. ENVTL. PROTECTION AGENCY (May 15, 2010), http://yosemite.epa.gov/opa/admpress.nsf/bd4379a92ceceeac8525735900400c27/f29adfca80ccd1a685257726004f0617!OpenDocument.

81. U.S. ENVTL. PROT. AGENCY, DISPERSANT MONITORING AND ASSESSMENT DIRECTIVE – ADDENDUM 2 (2010), *available at* http://www.epa.gov/bpspill/dispersants/directive-addendum2.pdf.

82. Goodell, *supra* note 5.

83. Letter from Doug Suttles, BP Chief Operating Officer, to Mary Landry, Fed. On-Site Coordinator, Rear Admiral, U.S. Coast Guard and Samuel Coleman, P.E., Dir., Superfund Div., U.S. Envtl. Prot. Agency (May 20, 2010), *available at* http://www.epa.gov/bpspill/dispersants/5-21bp-response.pdf.

84. U.S. ENVTL. PROT. AGENCY, DISPERSANT MONITORING AND ASSESSMENT DIRECTIVE – ADDENDUM 3 (2010), *available at* http://www.epa.gov/bpspill/dispersants/directive-addendum3.pdf.

percent.[85] The reason for the discrepancy was BP's frequent request for, and approval of, exemptions from the Coast Guard and EPA, which had the final approval authority.[86] Congressman Edward J. Markey chastised Admiral Thad Allen, National Incident Commander, for allowing surface application "virtually every day since the Directive was issued on May 26, 2010," until the flow of oil from the well was stopped.[87] Congressman Markey noted that in forty-eight days, BP, the Houma Unified Command, or both, made seventy-four requests for exemptions, and that in all but ten cases the Coast Guard approved the exemption without modifying the requested daily maximum quantities of dispersants. Additionally, in one of those ten cases, the Coast Guard increased the maximum dispersant use requested from 30,600 gallons to 43,000 gallons.[88]

While Congressman Markey was clearly challenging the Coast Guard's apparent rubberstamping of the exemptions, the Coast Guard was complaining that the approval process was not fast enough. On June 22, 2010, citing hardship and delay in the exemption approval process, Rear Admiral James Watson, the FOSC, asked the Region 6 RRT to draft a new addendum to "empower incident commanders to make real-time decisions to use appropriate amounts of dispersants" and "allow the use of dispersants to appropriately control volatile organic compounds."[89]

Despite Watson's request for more flexibility regarding quantities of dispersants, on June 23, 2010, the government issued "Guidance on Subsea Dispersant Application" which maintained the 15,000 gallon per day subsea dispersant limit but allowed increases in the application rate where winds were less than ten knots or where volatile organic compound (VOC) readings indicated potential health concerns.[90] In

85. U.S. Envtl. Prot. Agency, *EPA's Toxicity Testing of Dispersants*, U.S. ENVTL. PROTECTION AGENCY, http://www.epa.gov/bpspill/dispersants-testing.html (last visited Jan. 10, 2011).

86. FINAL REPORT, *supra* note 6, at 160.

87. Letter from Edward J. Markey, Congressman, to Thad Allen, Admiral, U.S. Coast Guard (July 30, 2010), *available at* http://markey.house.gov/docs/07-30-10ejmtocgdispersants.pdf.

88. *Id.*

89. Letter from James A. Watson, Fed. On-Scene Coordinator, Rear Admiral, U.S. Coast Guard, to Reg'l Response Team, Fed. Region VI (June 22, 2010), *available at* http://markey.house.gov/images/DISPERSANTDOCUMENTSJUNE22-24.pdf.

90. Letter from Douglas J. Suttles, BP Chief Operating Officer, to James A. Watson, Fed. On-Scene Coordinator, Rear Admiral, U.S. Coast Guard (June 23, 2010), *available at* http://markey.house.gov/images/DISPERSANTDOCUMENTSJUNE22-24.pdf; *see* 40 C.F.R. § 300.910(d) (allowing the on-scene coordinator to authorize dispersant use

reply to Congressman Markey's concerns, Admiral Allen noted that a FOSC must strike a balance between limiting the use of dispersants and protecting human health and safety at risk from sending responders closer to a hazardous environment.[91]

On July 6, 2010, BP responded to EPA's request for BP to provide a "high-level description of its plans going forward with regard to the use of dispersants."[92] BP assured the government that under all conditions, the use of subsea dispersants would be held under the 15,000 gallon limit but that, "it is critical that we maintain the capabilities to apply subsea dispersant to meet unforeseen contingencies such as weather disruptions or equipment failures."[93] Essentially, BP agreed to reduce dispersant use only if it successfully reduced the oil release and to stay within the 15,000 gallon limit only if circumstances allowed it.

The conflict over dispersant use continued throughout the oil spill response.[94] The final exchanges over dispersants included the government's denial of a BP request to apply 10,000 gallons of dispersants to oil slicks.[95] This generated a reply from the FOSC, protesting over the removal of dispersants from the response tool kit.[96] Ultimately the government prohibited BP from using any dispersants the day before BP capped the well.[97]

B. Dispersant Impacts to Species and Humans

In the hours following an oil spill, some of the oil disperses naturally due to wave action and ocean turbulence. Chemical dispersants are typically applied to the surface of the water to enhance the natural dispersion process by breaking down the oil into more fine droplets. Dispersed oil is less likely to reach nearshore and shoreline areas and is thought to minimize the direct contact wildlife have with the spilled oil.

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without obtaining concurrence of the EPA and state RRT representatives where use of a product is necessary "to prevent or substantially reduce a hazard to human life").

91. Letter from Thad Allen, Nat'l Incident Commander, Admiral, U.S. Coast Guard, to Edward Markey, Congressman (Oct. 1, 2010), *available at* http://www.oilspillcommission.gov/sites/default/files/documents/Allen%20Dispersants%20Letter%2010.1.10.pdf.

92. Letter from Doug Suttles, BP Chief Operating Officer, to James Watson, Fed. On-Site Coordinator, Rear Admiral, U.S. Coast Guard (July 6, 2010), *available at* http://www.scribd.com/doc/34931289/2010-07-06-Suttles-Watson.

93. *Id.*

94. FINAL REPORT, *supra* note 6, at 160-61.

95. *Id.* at 161.

96. *Id.*

97. *Id.*

Oil is highly toxic to most life forms. Specifically, the chemicals in crude oil, namely PAHs and VOCs, can damage major life systems and even prove fatal.[98] For example, during and after the BP oil spill, there were reports of high amounts of benzene, a carcinogen found in crude oil, and reports of people having difficulty breathing, headaches, internal bleeding, nausea, and other extreme symptoms.[99] The chemical compounds found in petroleum can affect the nervous system, reproductive system, circulatory system, endocrine system, gastrointestinal system, musculoskeletal system, and hematopoietic system.[100] This damage can be acute or chronic, and can manifest within moments or years.[101] Moreover, the effects of oil can occur through physical contact or contact via the food web.[102]

Dispersants themselves are also toxic, and can increase the toxicity of oil. Some dispersants contain nonylphenol ethoxylates which degrade into estrogenic compounds or endocrine disruptors.[103] Furthermore, dispersants can make it easier for oil to move through the skin of living organisms.[104] Currently, the precise effect of the use of dispersants, especially at the extreme volumes and depths BP applied them, are unknown.[105] Even EPA Administrator Lisa Jackson admitted "[w]e are still deeply concerned about these things we don't know. The long-term effect on aquatic life are still unknown, and we must make sure that the dispersants that are used are as non-toxic as possible."[106]

Dispersants may have increased the volume of oil in deepwater plumes—highly dispersed oil droplets and dissolved gases between thirty-two hundred and forty-two hundred feet deep and extending for many miles—with unknown effects on the deepwater environment.[107] The plumes of oil droplets and dispersants can engulf small plankton,

98. BURNS & HARBUT, *supra* note 76, at 3.
99. *See id.*
100. *Id.*
101. *Id.* at 9-10.
102. *Id.* at 4.
103. *Id.* at 8.
104. *Id.* at 14.
105. FINAL REPORT, *supra* note 6, at 182.
106. U.S. Envtl. Prot. Agency, *Statement by EPA Administrator Lisa P. Jackson From Press Conference on Dispersant Use in the Gulf of Mexico with U.S. Coast Guard Rear Admiral Landry*, U.S. ENVTL. PROTECTION AGENCY (May 24, 2010, 3:30 PM), http://www.epa.gov/bpspill/dispersants/transcript-may24.pdf.
107. FINAL REPORT, *supra* note 6, at 182; *see also* Juliet Eilperin et al., *Oil Spreading Much Farther Than Thought; Obama Returns to Gulf Coast*, WASH. POST May 29, 2010, http://www.washingtonpost.com/wp-dyn/content/article/2010/05/28/AR2010052801495.html?nav=emailpage.

fish eggs, and larvae. Loss of these food sources can cause a chain reaction affecting organisms throughout the food web.[108]

Also unknown is the biodegradation rate of dispersants themselves.[109] While LSC is reported to degrade in twelve to seventy days in seawater, and chemical dispersants can speed its degradation,[110] prior to the *Deepwater Horizon* oil spill, no deepwater applications of dispersant had been conducted, and thus no data existed on the environmental impacts of dispersants in deepwater.[111] Since the oil spill, scientists have discovered that a chemical component of the dispersants, the surfactant dioctyl sodium sulfosuccinate (DOSS) remained in the water sixty-four days after BP ceased applying dispersants.[112] Scientists found DOSS up to 300 kilometers from the well where it was applied, and concluded that rates of biodegradation have been negligible or slow.

An August 4, 2010, interagency report claimed that approximately 74 percent of the spilled oil was gone.[113] Internal emails regarding the report showed that NOAA Administrator Jane Lubchenco objected to this portrayal, saying that "[f]ifty percent of it is gone—either evaporated or burned, skimmed or recovered from the wellhead. 24 percent has been dispersed, and although much of this is in the process of being degraded, it is not 'gone' yet."[114] This disagreement illustrates one controversy regarding the use of dispersants: dispersed oil may be less visible, but that decreased visibility does not necessarily mean that the oil is gone altogether.

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108. *See generally* Charles H. Peterson et al., *Long-Term Ecosystem Response to the Exxon Valdez Oil Spill*, 302 SCI. 2082 (2003).

109. U.S. Envtl. Prot. Agency, *Questions and Answers on Dispersants*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/bpspill/dispersants-qanda.html#general (last visited Jan. 10, 2010).

110. Albert D. Venosa & E.L. Holder, *Biodegradability of Dispersed Crude Oil at Two Different Temperatures*, 54 MARINE POLLUTION BULLETIN 545, 547 (2007).

111. Elizabeth B. Kujawinski et al., *Fate of Dispersants Associated with the Deepwater Horizon Oil Spill*, 45 ENVTL. SCI. & TECH. 1298, 1298 (2011).

112. *Id.*

113. JANE LUBCHENCO ET AL., DEEPWATER HORIZON/BP OIL BUDGET: WHAT HAPPENED TO THE OIL? (Aug. 4, 2010), *available at* http://www.noaanews.noaa.gov/stories2010/20100804_oil.html.

114. Katie Howell, *Gulf Spill: E-mails show friction between White House, federal scientists over oil report*, E&ENEWSPM (Jan. 25, 2011), http://www.eenews.net/eenewspm/2011/01/25/archive/1?terms=oil+spill+budget.

PART IV: LESSONS LEARNED

It is evident that BP and the government were unprepared for the *Deepwater Horizon* oil spill. The complicated and critical question now is how can industry, government, and the public better prepare for the next oil spill.

A. Litigation Regarding Dispersants

Several ongoing lawsuits could force more rigorous agency compliance with the ESA and the CWA. For example, on June 2, 2010, the Center for Biological Diversity (the Center) notified the EPA and the Coast Guard of its intent to sue for ESA violations related to the approval and use of chemical dispersants in the Gulf of Mexico.[115] The Center alleged that dispersants may adversely affect multiple threatened and endangered species, including sea turtles, sperm whales, and Gulf sturgeon.[116] The Center is currently in negotiations with the EPA and Coast Guard to compel their compliance with section 7 of the ESA by consulting with the Services in order to ensure that listing Corexit 9500A, 9527A, and other dispersants in the NCP Product Schedule for use in oil spill response activities does not result in jeopardy to endangered species, or destruction or adverse modification of critical habitat.

In separate litigation, on July 14, 2010, the Florida Wildlife Federation and the Gulf Restoration Network sued the EPA over its failure to disclose information about chemical dispersants.[117] The complaint alleged that, in response to a Freedom of Information Act request, the EPA had disclosed the ingredients of chemical dispersants but refused to release requested health and safety information.[118] Resolution of this lawsuit could lead to more transparency in the approval process and use of dispersants.

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115. Letter from Andrea Treece, Senior Attorney, Ctr. for Biological Diversity, to Lisa Jackson, Adm'r, EPA & Robert J. Papp, Commandant, Admiral, U.S. Coast Guard (June 2, 2010), *available at* http://www.biologicaldiversity.org/programs/public_lands/energy/dirty_energy_development/oil_and_gas/gulf_oil_spill/pdfs/Gulf_dispersant_ESA_reconsultation_NOI_6-2-10.pdf.

116. *Id.*

117. *See* Press Release, Earthjustice, Conservation Groups Act to Uncover What's in Gulf Oil Dispersants (July 14, 2010), *available at* http://earthjustice.org/news/press/2010/conservation-groups-act-to-uncover-what-s-in-gulf-oil-dispersants.

118. Complaint at 8-9, Fla. Wildlife Fed'n, Inc. v. U.S. Envtl. Prot. Agency, (N.D. Fla. 2010) (Civ. 10-293).

Additionally, on October 13, 2010, a diverse group of organizations sent the EPA a petition to establish toxicity criteria and require toxicity testing and public disclosure of ingredients.[119] On the same day, the same groups sent the EPA a notice of their intent to sue the EPA over its failure to perform nondiscretionary duties under the CWA.[120] The groups specifically alleged that the EPA failed to publish a schedule identifying the waters in which dispersants, other chemicals, and other spill-mitigating devices and substances may be used and the quantities in which such substances can be used safely.[121] The petition and any resulting litigation could lead to the EPA adopting better testing disclosure procedures with respect to the use of dispersants.

B. Dispersants Reform

The government has begun the process of reviewing its regulations and existing ACPs and RCPs to reflect lessons learned during the *Deepwater Horizon* response.[122] The EPA is currently working on revising the regulations regarding the use of dispersants and other chemicals and the NCP Product Schedule.[123] On November 2, 2010, the EPA issued a memorandum announcing it was using information gathered as a result of the oil spill to engage federal partners via the NRT to reassess dispersant use guidelines under the NCP and to initiate review of the criteria and testing requirements for listing and delisting dispersants.[124] The EPA requested that the regional administrators ensure RRT representatives work with RRT partners to: implement changes to ACPs and RCPs; develop a hierarchy of preferred oil spill response measures; provide site-specific and oil-specific rationale for conditions

119. *See* Press Release, Earthjustice, How Toxic are Oil Dispersants? Groups Press EPA to Find Out Before Next Spill (Oct. 13, 2010), *available at* http://earthjustice.org/news/press/2010/how-toxic-are-oil-dispersants-groups-press-epa-to-find-out-before-next-spill.

120. *See id.*

121. Letter from Marianne Engelman Lado & Hannah Change, Counsel to Earthjustice, to Lisa Jackson, Adm'r, U.S. Envtl. Prot. Agency, Providing Sixty-day Notice of Intent to Sue 1 (Oct. 13, 2010), *available at* http://earthjustice.org/sites/default/files/files/dispersant_notice_0.pdf.

122. Memorandum from Mathy Stanislaus, Assistant Adm'r, U.S. Envtl. Prot. Agency, to Regional Adm'rs, U.S. Envtl. Prot. Agency, on the Revision of Area Contingency Plans/Regional Contingency Plans Regarding Use of Dispersants on Oil Spills – Interim Action (Nov. 2, 2010), *available at* http://www.rrt9.org/external/content/document/2763/948163/1/EPA to review ACPs memo.pdf.

123. *Id.*

124. *Id.*

or limitations for use of dispersants; create a process for evaluating use of dispersants; take steps to ensure data and decisions are transparent; and, as appropriate, reinitiate consultation on ACP/RCPs.[125] These steps, if implemented, could lead to better management of the use of dispersants and a more protective regime for the environment and wildlife.

While these efforts and ongoing litigation may lead to more protective measures, the EPA should reconsider whether dispersants are useful in light of the BP oil spill response efforts. The response activities raised many issues. For example, a pre-approval plan limit on the quantity of dispersants to be used appears to have been disregarded during the frantic response efforts. Perhaps a more effective scheme would result from tying the amount of dispersant use permitted to the amount of oil spilled or how close the spilled oil is to the shore.

The *Deepwater Horizon* response also raised questions over the toxicity of oil dispersants and their placement on the EPA's Product Schedule. Since the oil spill, the EPA has performed multi-phase toxicity testing for eight dispersants listed on the NCP Product Schedule.[126] The testing found that the dispersants are of similar toxicity and that Corexit 9500A is "generally no more or less toxic" than other available alternatives.[127] In addition, no dispersant displayed biologically significant endocrine-disrupting activity, a concern raised by BP in its response to EPA's May 20th directive to identify available dispersants below a specified toxicity level.[128] These results stand in contrast to the data in the NCP Product Schedule, which indicated that some pre-approved dispersants were both less toxic and more effective on LSC oil than Corexit 9500.[129]

The fact that the EPA felt compelled to perform additional toxicity testing of dispersants on the Product Schedule in the midst of the oil spill and the fact that the results of that testing differed from the manufacturer-supplied data undermines the entire Product Schedule

125. *See id.*

126. *See EPA Releases Second Phase of Toxicity Testing Data for Eight Oil Dispersants*, RESTORETHEGULF.GOV (Aug. 2, 2010, 11:39 AM), http://www.restorethegulf.gov/release/2010/08/02/epa-releases-second-phase-toxicity-testing-data-eight-oil-dispersants.

127. *Id.*

128. *Id*; *see also* Letter from Douglas J. Suttles, BP Chief Operating Officer, to Mary Landry, Fed. On-Site Coordinator, Rear Admiral, U.S. Coast Guard, & Samuel Coleman, Dir., Superfund Div. (May 20, 2010), *available at* http://www.epa.gov/bpspill/dispersants/ 5-21bp-response.pdf.

129. U.S. ENVTL. PROT. AGENCY, *supra* note 81.

testing and approval process. If the EPA continues to approve dispersants for use, it should strengthen the Product Schedule by independently testing dispersant toxicity and the potential for endocrine-disrupting activity *before* listing a dispersant. Toxicity testing should include testing on the long-term and sub-lethal effects of dispersant use, the environmental effects of dispersant-oil mixtures, and the effects of dispersants on a broader variety of species. A meaningful review of dispersants should also include consultation with the Services on the effects dispersants have on threatened and endangered wildlife *before* publication on the Product Schedule.

If these efforts reveal greater impacts to wildlife and the environment than oil alone, the EPA should not permit dispersant use as an oil spill response measure. At the very least, the EPA should reconcile the fact that regulations prohibit the use of "sinking agents" as a response measure.[130] These are prohibited because their impacts on productive benthic aquatic ecosystems would be greater than leaving the oil on the surface and because biodegradation at depth is slower due to reduced oxygen in bottom sediments.[131] EPA should ask whether applying the dispersants subsea may have had the same impact as a sinking agent.

PART V: CONCLUSION

BP's use of dispersants, like the oil spill itself, was extraordinary. While the CWA and the ESA authorize the EPA to regulate the use of dispersants, it is evident that the development of contingency plans for oil spills in the Gulf of Mexico and the pre-spill consultation process for dispersants failed to protect the environment. Scientific research indicates that dispersants have a previously unknown impact on deep water ecosystems and may compromise marine wildlife. Future preparedness for major oil spills requires, at a minimum, better agency implementation of the existing laws and regulations. In the meantime, EPA should continue to investigate to what extent the use of dispersants is a viable oil spill response measure.

130. *See* 40 C.F.R. §§ 300.310(b), 300.910(e).

131. U.S. ENVTL. PROT. AGENCY, OFFICE OF RESEARCH AND DEVELOPMENT, USE OF CHEMICAL DISPERSANTS FOR MARINE OIL SPILLS 6 (1993), *available at* http://www.epa.gov/nscep/.