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In re: Oil Spill by the Oil Rig "*Deepwater Horizon*" in the Gulf of Mexico, on April 20, 2010

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF LOUISIANA
MDL NO. 2179, SECTION J
JUDGE BARBIER; MAGISTRATE JUDGE SHUSHAN

Response Report of Mark G. VanHaverbeke

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September 12, 2014

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I. INTRODUCTION

On August 15, 2014, I offered an initial report in this litigation. On that same day, Frank M. Paskewich, Captain, U.S. Coast Guard (Retired) ("Captain Paskewich") offered a report on behalf of BP Exploration and Production, Inc. ("BP"). In this report I respond to certain opinions offered by Captain Paskewich in his August 15, 2014 report.

My initial report included a summary of my professional background and my résumé. There have been no changes or additions to my résumé, including my list of publications, since August 15, 2014. Other than the salary that I receive as a government employee, I am receiving no compensation for my expert work in this case. I have not previously testified as an expert witness.

In reaching my conclusions, I have relied upon my personal experience in the areas of oil spill response and oil spill response research and development ("R&D"). I have also reviewed and considered the documents cited throughout this report, Appendix B of this report, my expert report offered on August 15, 2014, and Appendix D of that report. In addition, I interviewed Rear Admiral Mary Landry, U.S. Coast Guard (Retired), ("Admiral Landry").

II. EXECUTIVE SUMMARY

In this report I respond to the opinions offered by Captain Paskewich in his expert report offered on August 15, 2014.

I offer four opinions after reviewing the report.

1. The Unified Command worked well, but much of the credit goes to the many stakeholders who supported the response.
2. Dispersion and burning are not the same as removing oil from the environment.
3. Decisions regarding dispersant application were made in an appropriate manner.
4. With few exceptions, the response relied on previous technological developments.

III. DISCUSSION

1. The Unified Command Worked Well, But Much of the Credit Goes to the Many Stakeholders Who Supported the Response

In subsection V.A. of his report, Captain Paskewich opines, among other things, that BP's contributions facilitated the implementation of a fully functional Unified Command organization that coordinated, supported, and directed large-scale operations over the course of the response. In section V.D.2.(a) he offers opinions on the impact of the media on the response. I offer the following responses.

Responding to a disaster of the scale of the Deepwater Horizon spill requires an organization sufficient in scale and uniquely tailored to the task. To the extent that the response was successful, that success must be attributed to the Unified Command rather than to BP alone. While there were many high points to the Deepwater Horizon response, there were areas that could have been handled better.

First, Admiral Landry, as Federal On-Scene Coordinator ("FOSC"), and Captain Roger Laferriere U.S. Coast Guard, (Retired), ("Captain Laferriere"), as the FOSC Representative ("FOSCR") at the Incident Command Post in Houma, both expressed concerns with BP's responsiveness even when they suggested that BP take specific actions. Federal leadership was still critical of BP in 2011 when Captain Julia Hein, U.S. Coast Guard, ("Captain Hein"), was the FOSC.

Admiral Landry stated that she had to repeatedly ask BP about establishing Forward Operating Bases ("FOBs") in Louisiana, to the point she testified that "...I went public in a press statement expressing my dissatisfaction or disappointment, and I only did that that time because I was frustrated and I -- I wanted it known I wanted BP to step it up in Louisiana. And they did."[1] She considered the FOBs critical to reducing travel and response time caused by the remote locations of the response operations. Therefore, Admiral Landry flew to the Incident Command Post in Houma to express her dissatisfaction with BP and to address the issue of FOBs.[2] The FOBs, designated as Branches under the Incident Command System ("ICS"), brought control of the operation closer to the front lines, allowing for better tactics, improved the span of command and control for the FOSCR, and provided more interaction at the local level.[3]

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[1] Landry Dep. at 391.

[2] *Id.* at 390-92.

[3] On Scene Coordinator Report Deepwater Horizon Oil Spill "FOSC Report" (TREX-009105) at 18 (September 2011).

Similarly, Captain Laferriere expressed concerns with BP's responsiveness. Captain Laferriere testified, "...I don't think they did a good job in the stakeholder management"[4] and, "it was a hard climb to get BP to do the expo, it took them almost a month to do that."[5] As Captain Paskewich notes on page 72 of his report, the expo-type events were a success in engaging the public.[6] In addition, BP did not initially comply with Captain Laferriere's request to double skimming resources (early in the response and following up in June).[7] Eventually, additional skimmers were provided.[8]

When Captain Hein was FOSC during 2011, after the response transitioned from offshore and on-water recovery to shoreline cleanup, she had to deal with both mistrust of BP by the states and direct negotiations between BP and the states (to the exclusion of the FOSC). A rigorous Shoreline Clean-up Completion Plan ("SCCP") was prepared and signed by members of the Unified Command, including BP and the FOSC, but implementation was not without challenges. Premature reductions in cleanup crews[9] and problems with decisions by cleanup crews set back relations with the states, causing mistrust that the FOSC had to rebuild.[10]

Second, the government's role in optimizing the response effort and contributions of other stakeholders were significant. While BP hired spill response organizations, government support and prodding optimized the response effort. For example, the National Weather Service ("NWS") increased its staff hours to provide assistance and deployed to the response, although initially told by BP that they were not needed.[11] The NWS effort was critical to day-to-day planning, and weather products specific to the response effort, such as real-time weather forecasting in support of air operations and in situ burning, heat stress monitoring and storm evacuation planning. Severe weather surveillance in the vicinity of field operations allowed responders maximum on-scene time yet sufficient warning to recover to safety when weather threatened.[12]

Other stakeholders, including state and local governments, academia, and industry, also made significant contributions to the response effort. For example, Exxon Mobil initially suggested to BP the concept of subsea dispersant application and provided in-house research to support the concept.[13]

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[4] Laferriere Dep. at 213.
[5] *Id.* at 214-15.
[6] Expert Report of Frank M. Paskewich at 72.
[7] Laferriere Dep. at 309, 349-50, 357-58, 369.
[8] *Id.* at 312, 368; D. Suttles (e-mail, June 17, 2010) (Ex. 13042).
[9] Hein Dep. at 87.
[10] *Id.* at 134-35.
[11] Graham, Kenneth and Robert Ricks, Deepwater Horizon Incident & National Weather Service Decision Support Services (2010) (US_PP_MVH004073).
[12] *Id.*
[13] Dupree Dep. at 236:11-238:8, 631:18-633:10.

Captain Paskewich offers a great deal of criticism concerning media outreach, yet some of the failures of media outreach can be attributed to BP. For example, Captain Laferriere noted that BP failed to incorporate the principles of risk communication into its media outreach from the start. BP only added a risk communication expert at the insistence of Captain Laferriere, but that was over a month into the response and too late to be effective.[14] Moreover, Captain Paskewich does not allege that these media outreach issues prevented the removal of oil or the protection of human health or the environment during the response. Rather, he concludes that, "the Coast Guard and BP continued to mount an effective Response despite these media challenges."[15]

2. Dispersion and Burning are Not the Same as Removing Oil from the Environment

In subsection V.B. of his report, Captain Paskewich opines that BP's efforts were extraordinarily effective and achieved a removal rate that greatly surpassed the norm for open ocean spill response.[16] I disagree for the following reasons.

First, it is important to remember that dispersants do not remove oil pollution from the marine environment.[17] Instead, oil is dispersed throughout the water column.[18] The use of dispersants represents a trade-off between limiting the potential for harm on the water surface and shorelines while increasing the potential for harm throughout the water column.[19] Similarly, in situ burning alters the composition of spilled oil and transfers a portion into the atmosphere as soot and gaseous emissions.[20] The transfer of byproducts to the atmosphere is recognized as a trade-off that, in many situations, poses less environmental threat than leaving the oil on the water surface.[21]

Second, the length of the discharge (87 days)[22] gave BP the opportunity to marshal and deploy forces and to adapt different ideas in a manner that is not possible with an instantaneous spill event. BP, under the Unified Command, began mustering people early, but the response effort did not reach its peak until July.[23] Additionally, burning and dispersing oil are most

[14] Laferriere Dep. at 276, 281, 299-301.
[15] Expert Report of Frank M. Paskewich at 59-60.
[16] Expert Report of Frank M. Paskewich at 18-19.
[17] FOSC Report (TREX-009105) at 33-34.
[18] *Id.*
[19] *Id.* at 34, 40.
[20] RRT VI In-Situ Burn Plan Part I (Operations Section) at I-1 (HCD020-013902).
[21] U.S. Coast Guard, Oil Spill Response Offshore, In-situ Burn Operations Manual (2003) at 6 (N7J007-004792).
[22] FOSC Report (TREX-009105) at 21, 23, 33, 151.
[23] Expert Report of Frank M. Paskewich at 14.

effective when the oil is relatively fresh, often hours to a few days in the case of dispersants and within 24 to 36 hours in the case of burning, depending on how quickly the oil evaporates or emulsifies.[24] As the *Deepwater Horizon* spill represented a continuous discharge, burning and dispersing remained viable options because a source of fresh oil was present until after the well was shut on July 15.[25] The final burn operation occurred on July 19.[26] In total, BP had a window of 90 days (April 20-July 19) in which options to burn or disperse oil were available. For comparison, during the *Exxon Valdez* spill response, dispersant application only occurred during the first few days following the ship's grounding until a storm system moved in on the evening of the third day, making dispersants no longer effective.[27] Responders conducted a successful trial in situ burn early in that response, but there were questions about the impact of residual smoke on local residents ashore. Those questions were still unresolved when, again, the storm system on the evening of the third day made conditions unfavorable for another burn.[28]

Third, measuring against "Oil Available for Recovery" ignores the 67 percent of the oil discharged and deemed unrecoverable. In situ burning and chemically dispersing oil accounted for thirteen percent of the total oil discharged, while direct recovery (skimming) only amounted to an unremarkable three percent of the 4.9 million barrels of oil discharged.[29] This rate is on par or below rates Captain Paskewich cites for other spills in Figure 7 of his report. During the *Exxon Valdez* response, during which responders' use of dispersants and in situ burning was severely limited, Captain Paskewich shows an eight percent recovery rate.[30]

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[24] National Research Council, Oil Spill Dispersants Efficacy and Effects (2005) at 3, 24, 29 (ANA-MDL-000264448); U.S. Coast Guard, Oil Spill Response Offshore, In-situ Burn Operations Manual at 24, 25 (N7J007-004792).

[25] The well was capped on July 15, 2010 (*see* FOSC Report , TREX-009105, at 44). Aerial dispersants were applied from April 22, 2010 (*see* FOSC Report, TREX-009105, at 34) until July 19, 2010 (*see* FOSC Report, TREX-009105, at 37, 44). Between April 28 and July 19, 2010, 411 burns were conducted offshore, removing five percent of the 4.9 million barrels of discharged oil. (*see* FOSC Report, TREX-009105 at 45).

[26] *Id.* at 212.

[27] National Research Council, Oil spill Dispersants Efficacy and Effects (2005) at 69 (ANA-MDL-000264448).

[28] National Response Team, The EXXON VALDEZ Oil Spill, A Report to the President (May 1989) at 19 (C2U004-000946).

[29] The Federal Interagency Solutions Group, Oil Budget Calculator Science and Engineering Team, Oil Spill Calculator, (2010) at 39 (BP-HZN-2179MDL09219786).

[30] Expert Report of Frank M. Paskewich at 19 fig.7.

3. Decisions Regarding Dispersant Application Were Made in An Appropriate Manner.

In subsection V.D.2.(b) of his report, Mr. Paskewich opines that the Environmental Protection Agency ("EPA") acted in a manner inconsistent with the National Oil and Hazardous Substance Contingency Plan ("NCP") in connection with the application of surface dispersants, specifically through Addenda 2 and 3 to the original May 10, 2010 Dispersant Monitoring and Assessment Directive. I disagree for the following reasons.

First, the discussion by Captain Paskewich and the sources he referenced regarding EPA's involvement in dispersant use decisions lacks context. The FOSC began discussions with the National Response Team ("NRT") membership, the EPA Administrator, and other senior administration officials in April to support the proposal for subsea dispersant application.[31] In addition to developing the protocols for subsea dispersant testing and monitoring, the participants discussed potential steps to reduce the surface application of dispersants should the subsea efforts prove effective.[32] The discussions lead to Addendum 3 of the Dispersant Monitoring and Assessment Directive.[33] Within the context of this first-ever Spill of National Significance ("SONS"), and the request for subsea application of dispersants, these discussions were completely appropriate.

Second, the fact that dispersants were pre-approved for use does not mean that their use was without limitations. The purpose of the pre-approval is to allow the FOSC to quickly arrive at a logical decision, thus allowing dispersants to be used when they would be at maximum effectiveness.[34] Prior to using dispersants, the response team must complete a checklist to see if conditions (sea state, winds, visibility, etc.) will allow dispersants to be applied effectively.[35] If the appropriate conditions are not met, there is no pre-approval for the use of dispersants and the Regional Response Team ("RRT") VI Regional Contingency Plan process must be followed.[36] Furthermore, dispersants will not be applied unless an appropriate oil slick can be located in an area where dispersants can be used. Consistent with these facts, Figure 20 of Captain Paskewich's report shows that no aerial dispersants were used at all on a number of days prior to Addendum 3 being issued on May 26, 2010.[37]

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[31] National Oil Spill Commission Meeting Conducted on Monday, September 27, 2010 "Meeting 3 Official Transcript" at 209-12 (BP-HZN-2179MDL03017551).
[32] *Id.* at 216-19.
[33] *Id.* at 201.
[34] RRT-6 FOSC Dispersant Pre-Approval Guidelines and Checklist (2001) at 1 (Ex. 11835).
[35] *Id.* at 5-8.
[36] *Id.*
[37] Expert Report of Frank M. Paskewich at 65 fig.20; Dispersant Tracking Spreadsheet (Ex. 12294).

Third, the unwritten assumption for pre-approval is that the discharge is anticipated to be a short-lived event and dispersants will be used for a short period of time.[38] Oil discharged from the Macondo well for 87 days.[39] Instead of a single discharge envisioned by the pre-approval process, this was more akin to 87 consecutive oil spills. The cumulative effect on the environment of this chronic exposure to dispersed oil associated with repeated applications of dispersants was unknown.[40] Captain Paskewich mentions that, in late May, a group of experts judged the use of dispersants for that period of time to be generally less environmentally harmful than allowing oil to reach sensitive shorelines, but he failed to mention that the experts' recommendations included that RRTs should provide for continual re-evaluation of tradeoff options going forward.[41] There is nothing inconsistent with the NCP in the FOSC deciding to reduce the use of dispersants after applying them for over a month, particularly where the application of aerial dispersants was coupled with the use of subsea dispersants. In evaluating the ongoing use of dispersants in an extended response, it is appropriate for the FOSC to take into account increases in the resources available for skimming and in situ burns, and any oil being recovered at the source.

Fourth, as discussed previously, dispersants do not remove oil pollution from the marine environment[42] and decisions concerning their deployment must take into account trade-offs between reducing the impact on the water surface and shorelines and increasing the potential for harm throughout the water column.[43] This is but one of many difficult information-driven decisions FOSCs must routinely make in managing the response to a spill. Most Coast Guard FOSCs are not scientists. They seek advice from other agencies with greater expertise, including the EPA, which is a member of both RRT VI and the NRT. Whether limiting the use of aerial dispersants after May 26th was the proper tradeoff is beyond the scope of this report, but this was one of many difficult decisions the FOSC was forced to make as a result of the discharge that resulted from BP's gross negligence and willful misconduct.[44]

Fifth, in a SONS, such as the Deepwater Horizon oil spill, the FOSC can receive advice and assistance from the National Incident Commander ("NIC") as well as both the RRT and the NRT.[45] For example, the NIC and the NRT were instrumental in establishing the Interagency Alternative Response Technology Assessment Program ("IATAP"), which was discussed in my earlier report.[46] In fact, the EPA chairs the NRT and the Coast Guard serves as vice-chair except

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[38] Austin Dep. at 166-67.
[39] FOSC Report (TREX-009105) at 21, 23, 33, 151.
[40] Capt. J. Hanzalik (E-mail, June 22, 2010) (Ex 11839) at 13, 14 & 16.
[41] *Id.* at 4.
[42] FOSC Report (TREX-009105) at 33-34.
[43] *Id.* at 34, 40.
[44] Findings of Fact and Conclusions of Law Phase One Trial (Document 13355) at paragraphs 499 & 611.
[45] FOSC Report (TREX-009105) at vi.
[46] Michele Fitzpatrick and Scott Fields, *Institutionalizing Emerging Technology Assessment Process into National Incident Response* (May 2012) (US_PP_MVH001521); Expert Report of Mark G. VanHaverbeke at 13.

during periods of NRT activation for a coastal zone spill, such as the *Deepwater Horizon* spill, when the Coast Guard chairs an incident-specific NRT.[47] The NRT participated in the decision and process by which subsea dispersant application was approved. I therefore disagree with the contention that EPA's advice regarding the dispersants was inconsistent with the NCP because it did not come through the RRT.

4. With Few Exceptions, the Response Relied on Previous Technological Developments.

In subsection V.F.2. of his report, Mr. Paskewich opines that BP developed and implemented groundbreaking innovative technologies. I offer the following responses.

First, many of the technologies applied in the *Deepwater Horizon* response were proposed to the Unified Command by others. For example, the application of subsea dispersant was suggested by Exxon Mobil; the Big Gulp skimmer cited by Captain Paskewich was developed and inserted into the response by the owner on his own initiative; the boom washing machines were the concept of the developers who came up with the idea after observing the efforts to manually clean booms.[48] As discussed in my initial report of August 15, experiences drawn from one oil spill response may not be directly transferable to other oil spill responses.[49]

Second, the response effort implemented previously developed concepts on a scale never before seen, to match the extraordinary size of the spill. For example, the equipment and processes for implementing and monitoring in situ burning offshore were developed in the 1990's through government and spill response organization efforts, but then sat on the shelf, except for drills, due to a lack of spills of sufficient magnitude to require implementation of the technology.[50] The RRT VI In Situ Burn Plan Part I (Operations Section) even includes an appendix entitled, "Fishing Vessels of Opportunity Utilization Guidelines" and the SMART Protocol includes air monitoring guidelines for in situ burning.[51] BP benefited from the past

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[47] *See* 40 C.F.R. 300.110(b); FOSC Report (TREX-009105) at 11 ("The EPA and Coast Guard co-chair the RRTs, among other responder stakeholders.").

[48] Dupree Dep. at 236:11-238:8, 631:18-633:10; Big Gulp Oil Skimmers (BP-HZN-2179MDL05983642); Jennifer Muzinic, *Developers turn Boom Blaster inventors* (October 2010) (US_PP_MVH004118); Gulp Oil Skimmers (US_PP_MVH004126).

[49] Expert Report of Mark G. VanHaverbeke (August 2014) at 16.

[50] U.S. Coast Guard Oil Spill Response Research & Development Program A Decade of Achievement, Report CG-D-07-03 (2003) at 19-21 (US_PP_USCG551986); U.S. Coast Guard, Oil Spill Response Offshore, In-situ Burn Operations Manual at 13 (N7J007-004792); Austin Dep at 140-141.

[51] RRT VI In-Situ Burn Plan Part I (Operations Section) at D-1 (HCD020-013902); Special Monitoring of Applied Response Technologies ("SMART") Protocol at 28-30 (OBR013447).

research effort, even employing one of the principal investigators (Al Allen, mentioned by Captain Paskewich on page 24 of his report) to assist with the in situ burn effort. The extensive period over which the *Deepwater Horizon* discharged oil provided a full-scale lab in which to further test and refine the in situ burn techniques previously developed in smaller scale research burns.

IV. CONCLUSION

Complex events require complex responses. The *Deepwater Horizon* spill was an extraordinary, unprecedented event in United States environmental history that called for a unified, national response that challenged concepts, processes and procedures developed, tested and refined on events of a much smaller scale. Two decades of post-*Exxon Valdez* planning, exercises, policy development and operational response positioned the spill response community, under the NCP, for success in managing the massive effort. When BP triggered the response, by unleashing the largest spill in United States history through gross negligence and willful misconduct, the federal government, the affected states, and an army of spill response contractors drew on those two decades of preparation to build up the largest unified response this country has ever seen. The unprecedented size of the spill required this equally unprecedented response effort. In its role in ensuring the safety and environmental integrity of the United States, the federal government played critical roles in both supporting the response effort and challenging assumptions, in some cases including BP's preferred response methods. Despite the extraordinary effort of the Unified Command, only one third of the oil discharged from the well was chemically dispersed, burned, skimmed, or directly recovered from the wellhead.

Appendix A: List of Acronyms

BP - BP Exploration and Production, Inc.
EPA - Environmental Protection Agency
FOB - Forward Operating Base
FOSC - Federal On-Scene Coordinator
FOSCR - Federal On-Scene Coordinator's Representative
IATAP - Interagency Alternative Technology Assessment Program
ICS - Incident Command System
NCP - National Contingency Plan
NIC - National Incident Commander
NRT – National Response Team
NWS – National Weather Service
R&D - Research and Development
RRT - Regional Response Team
SCCP - Shoreline Cleanup Completion Plan
SONS - Spill of National Significance

Appendix B: Sources Considered

The sources considered in preparation of this report include all documents cited in both this report and my Round 1 report, the consideration materials identified in conjunction with my Round 1 report, and the sources listed below.

Bates, Exhibit, TREX, or Other Description
ANA-MDL-000264448-ANA-MDL-000264843
BP-HZN-2179MDL03017551-BP-HZN-2179MDL03017740
BP-HZN-2179MDL04582731-BP-HZN-2179MDL04582737
BP-HZN-2179MDL05983642-BP-HZN-2179MDL05983643
BP-HZN-2179MDL07777618-BP-HZN-2179MDL07777657
BP-HZN-2179MDL09219786-BP-HZN-2179MDL09220002
BP-HZN-2179MDL09243039-BP-HZN-2179MDL09243089
BP-HZN-2179MDL09243165-BP-HZN-2179MDL09243169
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BP-HZN-2179MDL09245612-BP-HZN-2179MDL09245647
BP-HZN-2179MDL09246203-BP-HZN-2179MDL09246542
BP-HZN-2179MDL09246543-BP-HZN-2179MDL09246673
C2U004-0009460-C2U004-001020
CGL001-0004894-CGL001-0004894
Deposition Exhibit 11835
Deposition Exhibit 11839
Deposition Exhibit 11844
Deposition Exhibit 12044
Deposition Exhibit 12045
Deposition Exhibit 12184
Deposition Exhibit 12198
Deposition Exhibit 12294
Deposition Exhibit 12493
Deposition Exhibit 13042
Deposition of Allen, ADM Thad (Sept. 24, 2012)
Deposition of Allen, ADM Thad (Sept. 25, 2012)
Deposition of Austin, RADM Meredith (July 17, 2014)
Deposition of Dupree, James (16 Jun 2011)
Deposition of Dupree, James (17 Jun 2011)
Deposition of Hanzalik, CAPT James (June 17, 2014)
Deposition of Hein, CAPT Julia (July 9, 2014)
Deposition of Kulesa, Frank July 15, 2014

Deposition of LaFerriere, CAPT Roger (August 5, 2014)
Deposition of Utsler, Mike
Deposition of Landry, RADM Mary (Oct. 22, 2012)
Deposition of Landry, RADM Mary (Oct. 23, 2012)
Expert Report of Frank M. Paskewich
Expert Report of Mark G. VanHaverbeke
HCD020-013807-HCD020-014043
N7J007-004792-N7J007-004941
OBR013447 - OBR013492
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