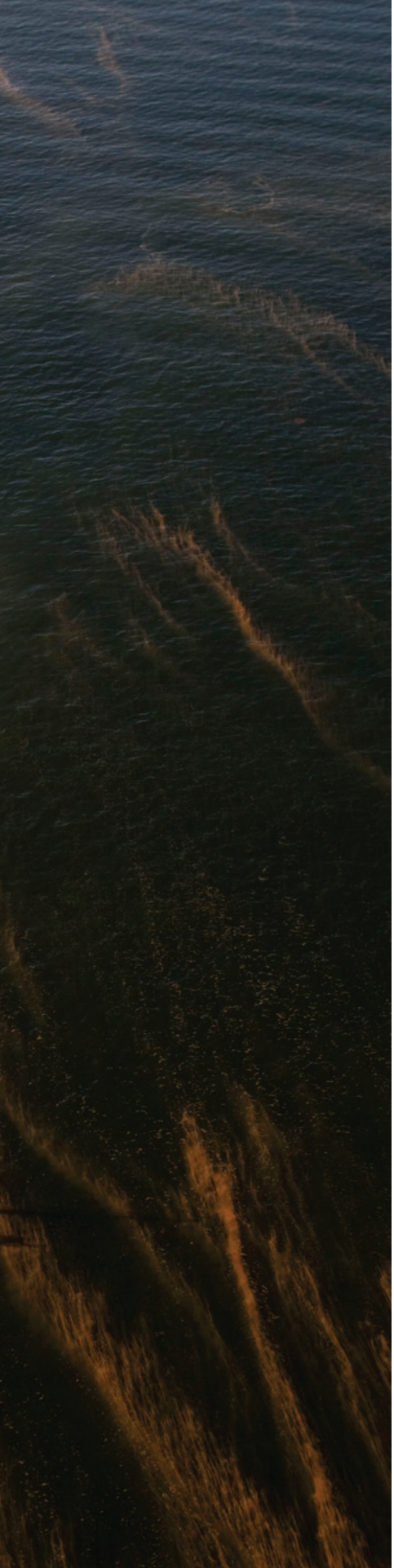


Chapter Five
"You're in it now, up to your neck!"

Response and Containment

No single story dominated newspaper headlines on April 21 and 22. America's most-read papers led with articles about the progress of financial reform legislation; the Supreme Court's 8–1 ruling in a case about video depictions of animal cruelty and the First Amendment; the death of civil rights leader Dorothy Height; and the Food and Drug Administration's plans to target sodium content in packaged foods.[1] Editors appear to have viewed these as slow news days. The *New York Times*, for example, ran a front-page story on April 22 about how travelers in Europe were coping with flight cancellations caused by volcanic ash, titled "Routine Flights Become Overland Odysseys, Minus Clean Socks."[2]

A reader who flipped 12 more pages into the *Times* would have encountered a less lighthearted headline: "11 Remain Missing After Oil Rig Explodes Off Louisiana."[3] *USA Today* and the *Wall Street Journal* covered the *Deepwater Horizon* explosion on their front pages on April 22.[4] The articles described the tragic accident and ensuing search-and-rescue operation—*USA Today* said it "could be one of the worst offshore drilling accidents in U.S. history"[5]—but did not discuss the potential for environmental calamity. As the *Los Angeles Times* put it, "Coast Guard experts worked to assess any environmental cleanup that may be necessary. . .

Shrimp boats skim oil off the coast of Louisiana in mid-May. At its peak, the response to the spill involved over 45,000 people and thousands of watercraft, including private "vessels of opportunity" put to work by BP. The well was finally capped on July 15—87 days after the explosion.

< Tyrone Turner/Photo courtesy of National Geographic

[b]ut the main focus was on the missing workers."[6] Other dimensions of the disaster would emerge in the days that followed.

The Early Response (April 20–28)

On the night of April 20, as the *Deepwater Horizon* burned and the rig's survivors huddled on the *Bankston*, the response began. Coast Guard helicopters from the Marine Safety Unit in Morgan City, Louisiana searched for missing crew members. The first Coast Guard cutter to join the search was the *Pompano*, with others to follow. An offshore supply vessel found two burned life rafts. Coast Guard responders knew that approximately 700,000 gallons of diesel fuel were on the rig and could spill into the Gulf. By 10:00 the next morning, planes involved in the search for survivors reported a variably-colored sheen, two miles long by half a mile wide, on the water.

The Captain of the Marine Safety Unit, Joseph Paradis, directed these preliminary efforts. He became the first Federal On-Scene Coordinator under what is known as the National Contingency Plan, a set of federal regulations prescribing the government's response to spills and threatened spills of oil and other hazardous materials.* Under the Plan, when a spill occurs in coastal waters, the Coast Guard has the authority to respond.[7]

As the search and rescue continued on April 21, the oily sheen grew, more Coast Guard personnel and resources became involved, and Rear Admiral Mary Landry took over as Federal On-Scene Coordinator. The commander of Coast Guard District 8 (which includes, among other regions, the Gulf coast from Texas to the Florida panhandle), she would remain Federal On-Scene Coordinator until June 1. While the firefighting efforts continued, she told reporters, "We are only seeing minor sheening on the water. . . . We do not see a major spill emanating from this incident."[8] At this point, Admiral Landry's concern was the fuel oil that could spill from the rig, though she cautioned, "We don't know what's going on subsurface."[9]

As Coast Guard vessels continued the search and rescue operation, private offshore supply vessels sprayed water on the fire. Transocean hired Smit Salvage Americas, a salvage company, to try to save the rig. There was confusion about whether Transocean, the Coast Guard, the salvage company, or anyone at all was directing the firefighting operations.† Captain James Hanzalik, Chief of Incident Response in District 8, would later say that the Coast Guard, which was focused on the search and rescue and then on the spreading oil, "monitored what was going on, but [was] not directing any firefighting resources."[10] By the morning of April 21, the rig was listing. At 11:53 that evening, it shifted and leaned even more.

At 10:22 a.m. on April 22, the rig sank, taking with it the diesel fuel still on board. By that time, the Coast Guard had established an Incident Command Post in a BP facility in Houma, Louisiana. BP had formed a command post in its corporate headquarters in

* Created in 1968, the National Contingency Plan has been amended and expanded in the years since. The Oil Pollution Act of 1990 substantially expanded the Plan in response to the *Exxon Valdez* spill.

† The Coast Guard/Bureau of Ocean Energy Management, Regulation, and Enforcement *Deepwater Horizon* Joint Investigation Team, which plans to issue a report in March 2011, is examining the firefighting efforts.

Houston, Texas shortly after the explosion, and the Coast Guard established an Incident Command Post there as well.

These Incident Command Posts, along with one in Mobile, Alabama, and others established later, would become the centers of response operations, with their activities directed by the Federal On-Scene Coordinator as part of the government's Unified Command. The latter is a command structure, created and implemented by the National Contingency Plan, which integrates the "responsible party" (here, BP) with federal and state officials "to achieve an effective and efficient response."[11] The Coast Guard established a Unified Area Command—headquarters for the regional spill response—on April 23 in Robert, Louisiana, later moving it to New Orleans. It eventually included representatives from the federal government, Louisiana, Alabama, Mississippi, Florida, and BP.

Other federal agencies—including the National Oceanic and Atmospheric Administration (NOAA) and Minerals Management Service (MMS)*—immediately sent emergency responders to the Unified Area Command and Incident Command Posts. A host of senior officials, including Secretary of the Interior Ken Salazar and Secretary of Homeland Security Janet Napolitano, briefed the President on their departments' efforts on the afternoon of April 22.[12] Members of the National Response Team, drawn from the 16 federal agencies responsible for coordinating emergency preparedness and response to oil- and hazardous-substance-pollution incidents,[13] began conducting daily telephone meetings.

Even before the rig sank, BP and Transocean directed their attention to the 53-foot-tall blowout preventer (BOP) stack sitting atop the Macondo well. At about 6:00 p.m. on April 21, BP and Transocean began using remotely operated vehicles to try to close the BOP and stop the flow of oil and gas fueling the fire.

These early operations primarily attempted to activate the BOP's blind shear ram and seal off the well. During the attempts, MMS officials were embedded, as observers, in the operations centers at Transocean and BP headquarters in Houston. Because of the emergency, on-scene personnel from BP, Transocean, and Cameron (the company that manufactured the BOP) made decisions without the need for government approvals. Beginning on April 21 and continuing throughout the effort to control the well, Secretary Salazar received daily updates through conference calls with BP's technical teams.

The initial news was encouraging. On April 23, Admiral Landry told the press that, according to surveillance by remotely operated vehicles, the BOP, although "[i]t is not a guarantee," appeared to have done its job, sealing off the flow of oil and preventing any leak.[14] The good news did not last. The Coast Guard suspended its search for the 11 missing workers later that day. And, when Admiral Landry spoke, remotely operated vehicles had not yet surveyed the entire length of the broken riser pipe—previously

* On June 18, 2010, Secretary of the Interior Ken Salazar ordered that the Minerals Management Service be officially renamed the Bureau of Ocean Energy Management, Regulation, and Enforcement. For consistency, throughout this chapter, we refer to the agency as the Minerals Management Service (MMS), its name at the time of the April 20 blowout.

Oil spews unchecked from the *Deepwater Horizon*'s severed riser in this video frame taken May 26. When the rig sank, the riser broke off, settling on the sea floor.

© BP p.l.c

connecting the well to the now-sunk *Deepwater Horizon*—that still jutted out of the top of the BOP. By mid-afternoon on April 23, the vehicles had discovered that oil was leaking from the end of the riser, where it had broken off from the *Deepwater Horizon* when the rig sank. By the next morning, the vehicles had also discovered a second leak from a kink in the riser, located above the BOP. On April 24, Unified Command announced that the riser was leaking oil at a rate of 1,000 barrels per day.[15] This number appears to have come from BP, although how it was calculated remains unclear.[16]

As BP realized that the early efforts to stop the flow of oil had failed, it considered ways to control the well other than by triggering the BOP. A primary option was to drill a relief well to intersect the Macondo well at its source and enable a drilling rig to pump in cement to stop the flow of oil. While it could take more than three months to drill, a relief well was the only source-control option mentioned by name in BP's Initial Exploration Plan.[17] Industry and government experts characterized a relief well as the only likely and accepted solution to a subsea blowout.[18] BP had begun looking for available drilling rigs on the morning of April 21; it secured two, and began drilling a primary relief well on May 2 and a back-up well insisted upon by Secretary Salazar on May 17.[19]

Responders, meanwhile, shifted their focus to the release of large amounts of oil. Although the National Contingency Plan requires the Coast Guard to supervise an oil-spill response in coastal waters, it does not envision that the Coast Guard will provide all, or even most, of the response equipment. That role is filled by private oil-spill removal organizations, which contract with the oil companies that are required to demonstrate response capacity. BP's main oil-spill removal organization in the Gulf is the Marine Spill Response Corporation, a nonprofit created by industry after the *Exxon Valdez* disaster to respond to oil spills. The Marine Spill Response Corporation dispatched four skimmers within hours of the explosion.[20] BP's oil-spill response plan for the Gulf of Mexico claimed that response vessels provided by the Marine Spill Response Corporation and other private oil-spill removal organizations could recover nearly 500,000 barrels of oil per day.[21]

Despite these claims, the oil-spill removal organizations were quickly outmatched. While production technology had made great advances since *Exxon Valdez* (see Chapter 2), spill-response technology had not. The Oil Pollution Act of 1990, by requiring double hulls in oil tankers, had effectively reduced tanker spills.[22] But it did not provide incentives for industry or guaranteed funding for federal agencies to conduct research on oil-spill response. Though incremental improvements in skimming and boom had been realized in

the intervening 21 years, the technologies used in response to the *Deepwater Horizon* and *Exxon Valdez* oil spills were largely the same.[23]

If BP's response capacity was underwhelming, some aspects of its response plan were embarrassing. In the plan, BP had named Peter Lutz as a wildlife expert on whom it would rely; he had died several years before BP submitted its plan. BP listed seals and walruses as two species of concern in case of an oil spill in the Gulf; these species never see Gulf waters. And a link in the plan that purported to go to the Marine Spill Response Corporation website actually led to a Japanese entertainment site.[24] (Congressional investigation revealed that the response plans submitted to MMS by ExxonMobil, Chevron, ConocoPhillips, and Shell were almost identical to BP's—they too suggested impressive but unrealistic response capacity and three included the embarrassing reference to walruses.[25] See Chapter 3 for more discussion of these plans.)

By April 25, responders had started to realize that the estimated spill volume of 1,000 barrels per day might be inaccurate. Dispersants applied to break up the surface slick were not having the anticipated effect. Either the dispersants were inexplicably not working, or the amount of oil was greater than previously suspected. Between April 26 and April 28, BP personnel within Unified Command reportedly said that they thought 1,000 to 6,000 barrels were leaking each day.[26]

To alert government leadership that the spill could be larger than 1,000 barrels per day, a NOAA scientist created a one-page report on April 26 estimating the flow rate at roughly 5,000 barrels per day. He based this estimate on other responders' visual observations of the speed with which oil was leaking from the end of the riser, as well as the size and color of the oil slick on the Gulf's surface.[27] Both methodologies, the scientist recognized, were highly imprecise: he relied on rough guesses, for example, of the velocity of the oil as it left the riser and the thickness of the surface slick. He told a NOAA colleague in Unified Command that the flow could be 5,000 to 10,000 barrels per day.[28] At a press conference on April 28, Admiral Landry stated, "NOAA experts believe the output could be *as much as* 5,000 barrels" (emphasis added).[29]

Although it represented a five-fold increase over the then-current figure, 5,000 barrels per day was a back-of-the-envelope estimate, and Unified Command did not explain how NOAA calculated it. Nevertheless, for the next four weeks, it remained the official government estimate of the spill size.

The Response Ramps Up (April 29–May 1)

At the peak of the response, more than 45,000 people participated.[30] In addition to deploying active-duty members to the Gulf, the Coast Guard called up reservists. Some 1,100 Louisiana National Guard troops served under the direction of Unified Command.[31] The Environmental Protection Agency (EPA), NOAA, and other federal agencies shifted hundreds of responders to the region.

Consistent with the Unified Command framework, BP played a major role from the outset. Most Coast Guard responders had a BP counterpart. For instance, Doug Suttles, BP's Chief

In a joint press briefing, BP Chief Operating Officer of Exploration and Production Doug Suttles takes the podium alongside Federal On-Scene Coordinator and Coast Guard Rear Admiral Mary Landry. The Coast Guard considered BP a co-combatant in the effort to battle the oil.

U.S. Coast Guard photo/Petty Officer 3rd Class Cory J. Mendenhall

Operating Officer of Exploration and Production, was the counterpart to the Federal On-Scene Coordinator. BP employees were scattered through the command structure, in roles ranging from waste management to environmental assessment. Sometimes, a BP employee supervised Coast Guard or other federal responders.

The preference under the National Contingency Plan is for the Federal On-Scene Coordinator to supervise response activities while the responsible party conducts—and funds—them. When a spill "results in a substantial threat to public health or welfare of the United States," the Plan requires the Federal On-Scene Coordinator to direct all response efforts.[32] The Coast Guard also has the option to "federalize" the spill—conducting and funding all aspects of the response through the Oil Spill Liability Trust Fund, and later seeking reimbursement from the responsible party.[33] But in most spills, especially when

the responsible party has deep pockets and is willing to carry out response activities, federalizing is not preferred. Coast Guard leaders, shaped by their experience implementing the National Contingency Plan through a unified command system, viewed the responsible party as a co-combatant in the fight against the oil. From their perspective, BP took its role as responsible party seriously and had an open checkbook for response costs.* That did not mean BP was happy to pay. Tony Hayward, the Chief Executive Officer of BP, reportedly asked board members, "What the hell did we do to deserve this?"[34]

Though willing to fund and carry out the response, BP had no available, tested technique to stop a deepwater blowout other than the lengthy process of drilling a relief well. Forty years earlier, the government had recognized the need for subsea containment technology. In 1969, following the Santa Barbara Channel spill, the Nixon administration had issued a report recommending, in part, that "[u]nderwater methods to collect oil from subsea leaks should be developed."[35] For deepwater wells, however, such development had never occurred. Within a week of the explosion, BP embarked on what would become a massive effort to generate containment options, either by adapting shallow-water technology to the deepwater environment, or by designing entirely new devices. Different teams at BP's Houston headquarters focused on different ways either to stop the flow of oil or to collect it at the source. Each team had what amounted to a blank check. As one contractor put it, "Whatever you needed, you got it. If you needed something from a machine shop and you couldn't jump in line, you bought the machine shop."[36]

While the Coast Guard oversaw the response at the surface, MMS primarily oversaw source-control operations. BP would draft detailed procedures describing an operation it wished to perform around the wellhead. MMS and Coast Guard officials in Houston participated in the drafting process to help identify and mitigate hazards, including risks to worker safety. At Unified Area Command, Lars Herbst, MMS Gulf of Mexico Regional Director, or his deputy, Mike Saucier, would review and approve the procedures, before the Federal On-Scene Coordinator gave the final go-ahead. This hierarchy of approvals remained in place throughout the containment effort.

MMS was the sole government agency charged with understanding deepwater wells and related technology, such as BOPs. But its supervision of the containment effort was limited, in line with its role in overseeing deepwater drilling more generally. Its staff did not attempt to dictate whether BP should perform an operation, determine whether it had a significant likelihood of success, or suggest consideration of other options. This limited role stemmed in part from a lack of resources. At most, MMS had four to five employees in Houston trying to oversee BP's efforts. One employee described his experience as akin to standing in a hurricane.

Interviews of MMS staff members involved in the containment effort also suggest that the agency did not view itself as capable of, or responsible for, providing more substantive oversight. One MMS employee asserted that BP, and industry more broadly, possessed 10

* The day the rig exploded, the emergency reserve available to the Federal On-Scene Coordinator in the Oil Spill Liability Trust Fund and not obligated to other ongoing response actions amounted to $18,600,000. In contrast, by November 11, 2010, BP had paid $580,977,461 to the federal government for response costs. BP's total expenditures on the response also included payments to states and to contractors it hired directly. Paul Guinee, e-mail to Commission staff, November 16, 2010; BP, *Claims and Government Payments Gulf of Mexico Oil Spill Public Report* (November 11, 2010).

times the expertise that MMS could bring to bear on the complex problem of deepwater spill containment. Another pointed out that MMS had trouble attracting the most talented personnel, who are more likely to work in industry where salaries are higher. A third MMS employee stated that he could count on one hand the people from the agency whom he would trust to make key decisions in an effort of this magnitude. Perhaps most revealingly, two different MMS employees separately recalled being asked—one by Secretary Salazar, and the other by Assistant Secretary Tom Strickland—what they would do if the U.S. government took over the containment effort. Both said they would hire BP or another major oil company.

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. At an April 29 press conference with several senior administration officials, Coast Guard Rear Admiral Sally Brice O'Hara referred to BP as "our partner," prompting Secretary Napolitano to emphasize, "They are not our partner."[37] Secretary Salazar later said on *CNN* that the government would keep its "boot on the neck" of BP.[38]

While struggling to explain its oversight role to the public, the federal government increased its commitment to the spill response. On April 29, a week after the rig sank and a day after the flow-rate estimate rose to 5,000 barrels per day, the Coast Guard designated the disaster a "Spill of National Significance"[39]—the first time the government had used that designation. A Spill of National Significance is one "that due to its severity, size, location, actual or potential impact on the public health and welfare or the environment, or the necessary response effort, is so complex that it requires extraordinary coordination of federal, state, local, and responsible party resources to contain and clean up the discharge."[40] The designation permitted a National Incident Commander to "assume the role of the [Federal On-Scene Coordinator] in communicating with affected parties and the public, and coordinating federal, state, local, and international resources at the national level."[41] Other than the quoted sentence, the National Contingency Plan is silent on the role of the National Incident Commander, who can fill the position, and what tasks he or she will handle. As a result, there is no clear line between the National Incident Commander's responsibilities and those of the Federal On-Scene Coordinator. During the *Deepwater Horizon* spill response, the National Incident Commander coordinated interagency efforts on the wide variety of issues responders faced, and dealt with high-level political and media inquiries, while the Federal On-Scene Coordinator generally retained oversight of day-to-day operations. More than anyone else, the National Incident Commander became the face of the federal response. When President Obama visited the Gulf on May 2, a fisherman asked who would pay his bills while he was out of work; the President responded that the National Incident Commander would take care of it.[42]

On May 1, Secretary Napolitano announced that Admiral Thad Allen, the outgoing Commandant of the Coast Guard and then its only four-star Admiral, would serve as National Incident Commander.[43] Admiral Allen was well known in the Gulf. He had previously overseen the ocean rescue and return to Cuba of Elian Gonzalez in 1999; the Coast Guard's work securing harbors along the Eastern Seaboard after the attacks of September 11, 2001; and the federal response to Hurricanes Katrina and Rita, after the

Surrounded by orange containment boom, National Incident Commander Admiral Thad Allen speaks to the press in Venice, Louisiana. The outgoing Coast Guard Commandant postponed his retirement to assume the post, drawing on his experience leading the federal response to Hurricane Katrina and overseeing oil-spill readiness exercises in the Gulf.

Steven Johnson/Miami Herald/MCT via Getty Images

Bush Administration asked him to replace the stumbling director of the Federal Emergency Management Agency, Michael Brown, as the lead federal official.[44] His leadership during Katrina was widely considered a success. A Baton Rouge *Advocate* editorial published near the end of his time in the Gulf highlighted his local popularity and thanked him for his service.[45] Less celebrated in the media, but no less important for the task facing him as National Incident Commander, was Admiral Allen's role overseeing a 2002 simulation that tested the readiness of the Coast Guard and other agencies to respond to a Spill of National Significance off the coast of Louisiana.[46] As Commandant, Admiral Allen was already participating in the response, and he put off his scheduled retirement when he became National Incident Commander.

As the National Incident Command took shape in early May, BP's efforts to stop the flow of oil continued to focus on actuating the BOP, which BP still believed was the best chance of quickly shutting in the well. These efforts were plagued by engineering and organizational problems. For instance, it took nearly 10 days for a Transocean representative to realize that the stack's plumbing differed from the diagrams on which BP and Transocean were relying, and to inform the engineers attempting to trigger one of the BOP's rams through a hydraulic panel that they had been misdirecting their efforts.[47] (Without properly recording the change, Transocean had reconfigured the BOP; the panel

that was supposed to control that ram actually operated a different, "test" ram, which could not stop the flow of oil and gas.[48] BP Vice President Harry Thierens, who was BP's lead on BOP interventions, stated afterward that he was "quite frankly astonished that this could have happened."[49]) While this and other problems delayed BP's efforts, the flow of oil and sand continued to wear down the BOP's parts, making closure more difficult.[50]

BP stopped trying to close the BOP on May 5.[51] By May 7, it had concluded that "[t]he possibility of closing the BOP has now been essentially exhausted."[52] In mid-May, at the suggestion of Secretary of Energy Steven Chu, BP undertook gamma-ray imaging of the BOP, which lacked instrumentation to show the position of its rams.[53] The imaging indicated that, although the blind shear ram had closed at least partially, oil continued to flow past it.

The "Social and Political Nullification" of the National Contingency Plan (April 29–May 1)

The hurricane-stricken Gulf states are all too familiar with emergency response; all are among the top dozen states in number of declared major disasters.[54] State and local officials in the Gulf are accustomed to setting up emergency-response structures pursuant to the Stafford Act, under which the federal government provides funding and assists state and local governments during a major disaster.[55] In contrast, the National Contingency Plan, which governs oil spills, gives the Federal On-Scene Coordinator the power to direct all response actions.[56] Thus, while the Stafford Act envisions a state-directed (though in part federally funded) response, the National Contingency Plan puts federal officials in charge.

State and local officials chafed under federal control of the response. Louisiana Governor Bobby Jindal's advisors reportedly spent days trying to determine whether the Stafford Act or the National Contingency Plan applied.[57] On April 29, Governor Jindal declared a state of emergency in Louisiana, authorizing the director of the Governor's Office of Homeland Security and Emergency Preparedness to undertake any legal activities deemed necessary to respond and to begin coordinating state response efforts.[58] These efforts took place outside of the Unified Command framework. The Governors of Mississippi, Alabama, and Florida followed suit, declaring states of emergency the next day.[59]

At the outset of the spill, the pre-designated State On-Scene Coordinators for Louisiana, Alabama, and Mississippi participated in Unified Command.[60] These individuals were career oil-spill responders: familiar with the National Contingency Plan, experienced in responding to spills, and accustomed to working with the Coast Guard. Some had participated in the 2002 spill exercise run by Admiral Allen. They shared the Coast Guard's view that the responsible party is an important ally, not an adversary, in responding to a spill.

During this spill, however, the Governors and other state political officials participated in the response in unprecedented ways, taking decisions out of the hands of career oil-spill responders. These high-level state officials were much less familiar with spill-response

planning. In addition to the National Contingency Plan, each Coast Guard sector is an "Area" with an Area Contingency Plan created by relevant state and federal agencies. When confronted with a contingency plan setting out how the federal and state governments were supposed to run an oil-spill response, one high-level state official told a Coast Guard responder that he never signed it. According to the Coast Guard officer, the state official was not questioning whether his signature appeared on the document, but asserting that he had not substantively reviewed the plan.[61] State and local officials largely rejected the pre-spill plans and began to create their own response structures.

Because the majority of the oil would come ashore in Louisiana, these issues of control mattered most there. Louisiana declined to empower the officials that it sent to work with federal responders within Unified Command, instead requiring most decisions to go through the Governor's office. For example, the Louisiana representative at Unified Area Command could not approve the daily agenda of response activities.[62] Responders worked around this problem, but it complicated operations.

Local officials were even less familiar with oil-spill planning, though they had robust experience with other emergencies. Under Louisiana law, Parish Presidents exercise substantial authority—mirroring that of the Governor—during hurricanes and other natural disasters.[63] The parishes wanted to assert that same control during the spill, and many used money distributed by BP to purchase their own equipment and establish their own operating centers outside of Unified Command. Eventually, the Coast Guard assigned a liaison officer to each Parish President, who attempted to improve relationships with the parishes by providing information and reporting back to Unified Command on local needs.

Local resentment became a media theme and then a self-fulfilling prophesy. Even those who privately thought the federal government was doing the best it could under the circumstances did not say so publicly.[64] Coast Guard responders watched Governor Jindal—and the TV cameras following him—return to what appeared to be the same spot of oiled marsh day after day to complain about the inadequacy of the federal response, even though only a small amount of marsh was then oiled. When the Coast Guard sought to clean up that piece of affected marsh, Governor Jindal refused to confirm its location.[65] Journalists encouraged state and local officials and residents to display their anger at the federal response, and offered coverage when they did. Anderson Cooper reportedly asked a Parish President to bring an angry, unemployed offshore oil worker on his show. When the Parish President could not promise the worker would be "angry," both were disinvited.[66]

As the media coverage grew more frenzied, the pressure increased on federal, state, and local officials to take action and to avoid being seen as in league with BP. What Admiral Allen would later call "the social and political nullification" of the National Contingency Plan, which envisions "unity of effort" between the federal government, state governments, and the responsible party, was well underway.[67]

Spill Impacts and Efforts To Help

Effects on the Gulf economy, environment, and way of life increased as the spill dragged on and oil crept closer to shorelines. Concerns about fisheries took hold immediately. The

Gulf of Mexico is home to crab, shrimp, oyster, and finfish fisheries, all of which were affected by the oil. The Louisiana Department of Wildlife and Fisheries and the Department of Health and Hospitals began closing fisheries and oyster grounds in state waters—three miles or less from shore—on April 30. State fishery closures continued piece by piece, beginning on June 2 in Alabama, June 4 in Mississippi, and June 14 in Florida.[68] NOAA's Office of Response and Restoration began conducting flyovers and modeling the movement of the oil beginning April 23.[69] Responders used these daily trajectory forecasts to anticipate where oil would be over the next 24- and 48-hour periods. Based on the forecasts, as well as sampling in or near affected areas, the federal fishery closures began on May 2. Through an emergency rule, NOAA's National Marine Fisheries Service first closed an area spanning approximately 6,817 square miles, or 3 percent of the Gulf federal fishing zone.[70] On May 7, NOAA increased the closed area to 4.5 percent of that zone.[71] A week later, it extended the closures indefinitely.[72] NOAA continued to close additional areas, and on June 2—at the peak of the closures—it prohibited all fishing in nearly 37 percent of the Gulf zone.[73]

Although unable to fish, many fishermen were not content to lay idle. As contractors and subcontractors set up camp in towns across the Gulf to carry out response activities, residents viewed them with suspicion. People in Lafourche Parish, for example, worried about the out-of-state oil-spill-response contractors who took over their shores bringing crime and taking away spill-related job opportunities.[74] Parish Presidents pushed BP and Unified Command to give clean-up jobs to residents and, in the newly out-of-work fishermen, saw a fleet of experienced captains who were more familiar with the intricate shoreline than any out-of-state oil-spill responders.

The Vessels of Opportunity program was BP's answer, and a way for BP to provide some income to affected residents outside of the formal claims process. Through the program, BP employed private vessels to conduct response efforts such as skimming, booming, and transporting supplies. Vessels of opportunity made between $1,200 and $3,000 per day, depending on the size of the boat. Individual crew members made $200 for an eight-hour day.[75] But the program had delays and problems. BP and the Coast Guard were slow to develop eligibility requirements (such as an operable VHF-FM radio) for boats.[76] Initially, there was not enough work. Later, residents and Parish Presidents complained that BP was not sufficiently targeting out-of-work fishermen at whom the program was ostensibly directed, and that wealthy or non-local boat owners were taking advantage of poor oversight to gain spots in the program. Eventually, BP established a verification process that prioritized boats registered with the state before March 2010 and that accepted only one boat per owner.[77] The group that may have lost out the most on the program was the large population of Vietnamese-American fishermen. Many had arrived in the region as refugees and struggled with the lack of Vietnamese-language training.[78] (Chapter 6 discusses the impacts of the spill on minority fishing communities.)

Angry that BP was deploying non-local boats in his parish waters, Craig Taffaro, President of St. Bernard Parish, started his own program using the commercial fishing fleet based there. He submitted invoices to BP, which it paid. The State of Louisiana also began its own program, as did Plaquemines and Jefferson Parishes.[79] Unified Command struggled

to coordinate this floating militia of independent vessels and to give them useful response tasks. Having hundreds of vessels look for oil did not contribute significantly to the response, because aircraft were more effective at spotting oil.[80] Placing boom requires skill and training, and responders differed in their judgments of how much the vessels contributed.

In addition to overseeing the Vessels of Opportunity program, Unified Command needed to ensure that all workers, whether on boats or on shore, were adequately trained and taking safety precautions. The Occupational Safety and Health Administration (OSHA) began working with Unified Command at the end of April; under the National Contingency Plan, all response actions must comply with OSHA's training and safety requirements.[81] OSHA established rules regarding protective equipment and, because the response relied in part on untrained workers, a shortened training course.[82] Residents were eager to take on clean-up jobs, but some worried that, notwithstanding OSHA's involvement, response-related work would affect their health.[83] (Chapter 6 discusses the impacts of response activities on health.)

Health issues for non-workers were thornier. The Centers for Disease Control and Prevention represents the Department of Health and Human Services on the National Response Team and had participated in recent spill training exercises. The Centers for Disease Control, however, had not foreseen that an oil spill could affect the health of the broader population and had not fully considered the role health agencies might play in a spill response.[84] Others in the Department, including the Assistant Secretary for Preparedness and Response, had not either.[85] Consequently, the Department had to consider during the disaster how it would fund spill-related activities, because BP would have to pay only for those deemed response measures by Unified Command. The Department was concerned that neither the Oil Spill Liability Trust Fund nor BP would reimburse it for activities such as long-term health surveillance, and negotiations over what costs qualified for reimbursement took time.[86] At the request of Unified Command, Health and Human Services eventually, in June, sent a Senior Health Policy Advisor to support the National Incident Commander on public health issues.[87]

The spill affected wildlife health as well. On April 30, the *Times-Picayune* reported the recovery of the first oiled bird.[88] From then on, crude-covered animals were a fixture in the media coverage and public perceptions of the disaster. The U.S. Fish and Wildlife Service, NOAA's Fisheries Service, state wildlife agencies, and academic organizations oversaw animal response and rehabilitation efforts.[89] Wildlife responders took recovered animals to one of several treatment centers, washing, monitoring, and then releasing them.[90] According to the Audubon Society, more than 12,000 volunteers signed up to help with these efforts during a single week in early May.[91] Not all offers of assistance were accepted. Some groups that could have provided skilled wildlife responders, such as the National Wildlife Federation, felt discouraged from helping; in their view, there was no effective process for integrating skilled volunteers into the response structure.[92] Would-be volunteers worried that animal mortality was greater than it would have been had more rescuers been out looking for oiled animals.[93] (Chapter 6 discusses impacts on wildlife in detail.)

Free once more, a pair of pelicans test their wings in Aransas National Wildlife Refuge after being de-oiled and nursed back to health. Taking part in the release are veterinarian Sharon Taylor and Refuge manager Dan Alonso. Over a thousand birds affected by the spill were rehabilitated; thousands of others were not so fortunate.

U.S. Coast Guard photo/Petty Officer 3rd Class Robert Brazzell

Along with volunteering for wildlife rescue, members of the general public submitted to BP and the Coast Guard numerous ideas for how to clean up the oil or plug the well. For instance, movie star Kevin Costner argued for the use of his oil-water separator, and BP eventually purchased 32 units.[94] Citizens without Costner's resources had more trouble getting their ideas reviewed. On June 4, the Coast Guard established the Interagency Alternative Technology Assessment Program to receive, acknowledge, and evaluate ideas.[95] The program received about 4,000 submissions.[96] Most of the proposals were not viable or required too much time for development into operational response tools.* As ideas came in, the Coast Guard screened them and sent the most promising to the Federal On-Scene Coordinator, who ended up testing about a dozen during the course of the spill. None was implemented on a large scale, but the Coast Guard plans to use some of the proposals in its spill-response research.[97]

Foreign companies and countries also offered assistance in the form of response equipment and vessels. The Coast Guard and National Incident Command accepted some of these offers and rejected others.[98] News reports and politicians alleged that the federal government turned away foreign offers of assistance because of the Jones Act, a law preventing foreign vessels from participating in trade between U.S. ports.[99] While decisionmakers did decline to purchase some foreign equipment for operational reasons—

* Although intellectual property concerns prohibit the Coast Guard from disclosing the proposals actually submitted, news outlets reported that individuals suggested ideas like dumping popcorn from airplanes; soaking up the oil with packing peanuts, sawdust, kitty litter, and air conditioning filters; and using liquid nitrogen to freeze the oil. Julie Schmit, "After BP Oil Spill, Thousands of Ideas Poured in for Cleanup," *USA Today,* November 15, 2010; John W. Schoen, "BP's Suggestion Box Is Spilling Over," MSNBC, May 14, 2010.

for example, Dutch vessels that would have taken weeks to outfit and sail to the region, and a Taiwanese super-skimmer that was expensive and highly inefficient in the Gulf—they did not reject foreign ships because of Jones Act restrictions.[100] These restrictions did not even come into play for the vast majority of vessels operating at the wellhead, because the Act does not block foreign vessels from loading and then unloading oil more than three miles off the coast.[101] When the Act did apply, the National Incident Commander appears to have granted waivers and exemptions when requested.[102]

In the end, the response technology that created the most controversy was not a mechanical tool like a skimmer or oil-water separator, but a chemical one.

Initial Dispersant Decisions (April 30–May 10)

Even before they were certain that oil was spilling into the Gulf, responders had readied planes full of dispersants to use in a potential response. Dispersants include surfactants that break down oil into smaller droplets, which are more likely to dissolve into the water column.[103] On April 24, once Unified Command knew a leak existed and coastal impacts were possible, Admiral Landry told reporters: "We have one-third of the world's dispersant resources on standby. . . . Our goal is to fight this oil spill as far away from the coastline as possible."[104] Faced with what one Coast Guard captain called a "tradeoff of bad choices" between spraying chemicals on the water or watching more oil reach the shore,[105] responders would wield dispersants in the battle against oil for the next 12 weeks, using novel methods and unprecedented volumes.

Dispersants do not remove oil from the water altogether. Energy from wind and waves naturally disperses oil, and dispersants accelerate this process by allowing oil to mix with water. Dispersed oil is diluted as it mixes vertically and horizontally in the water column.[106] Using dispersants has several potential benefits. First, less oil will reach shorelines and fragile environments such as marshes.[107] Second, animals and birds that float on or wade through the water surface may encounter less oil.[108] Third, dispersants may accelerate the rate at which oil biodegrades.[109] Finally, responders to an oil spill can use dispersants when bad weather prevents skimming or burning. But dispersants also pose potential threats. Less oil on the surface means more in the water column, spread over a wider area, potentially increasing exposure for marine life. Chemically dispersed oil can be toxic in both the short and long term. Moreover, some studies have found that dispersants do not increase biodegradation rates—or may even inhibit biodegradation.[110]

At the direction of the Federal On-Scene Coordinator, responders first sprayed dispersants on the surface oil slick on April 22.[111] Long before the spill, interagency "Regional Response Teams" had evaluated and preauthorized the use of specific dispersants in the Gulf of Mexico, with limits as to geographic areas where the chemicals could be applied, but not on overall volume or duration of use.[112] The teams included representatives from relevant state governments and from federal agencies with authority over oil spills, including the Coast Guard, EPA, the Department of the Interior, and NOAA. Preauthorization, requiring the concurrence of the Team, allows the Federal On-Scene Coordinator to employ dispersants immediately following a spill.[113] Timing matters, because the chemicals

are most effective when oil is fresh, before it has weathered and emulsified.[114] Without preauthorization, responders can still use dispersants during a spill if EPA and state authorities approve.[115] With the permission of the Federal On-Scene Coordinator, BP and its contractors applied 14,654 gallons of the dispersant Corexit on the surface during the week of April 20 to 26.[116]

Under the terms of the preauthorization, Corexit was a permissible dispersant because EPA listed it on the National Contingency Plan Product Schedule. EPA obtains toxicity data from the manufacturer before placing a dispersant on that schedule.[117] Some toxicologists have questioned the reliability and comparability of the testing by manufacturers.[118] Moreover, the required testing is limited to acute (short-term) toxicity studies on one fish species and one shrimp species;[119] it does not consider issues such as persistence in the environment and long-term effects.

Dispersant use increased during the first weeks of the spill. From April 27 to May 3, responders applied 141,358 gallons to the surface. The following week, they applied 168,988 gallons. The Coast Guard and other responders had often deployed dispersants to respond to spills, but never in such volumes; during the *Exxon Valdez* spill, responders sprayed about 5,500 gallons, and that use was controversial.[120]

Faced with high-volume dispersant use, Gulf residents became concerned that the chemicals were just as bad as the spilled oil itself. Some workers reported nausea and headaches after coming into contact with dispersants.[121] However, OSHA found no evidence of unsafe dispersant exposure among responders.[122] Environmental groups pressured Nalco, the company that manufactures Corexit, to disclose its formula. Although it had given the formula to EPA during the pre-listing process, Nalco declined to make the formula public, citing intellectual property concerns.[123] This decision did not reassure the citizens of the Gulf.

As the volume of dispersants sprayed on the surface grew, BP raised the idea of applying dispersants directly at the well, rather than waiting for the oil to reach the surface a mile above.[124] Responders had never before applied dispersants in the deep sea. Within Unified Command, some scientists were cautiously optimistic. They hoped that, in addition to reducing shoreline impacts, subsea application would mean less dispersants used overall, because they would be more effective in the turbulent subsea environment. Responders would later conclude that subsea dispersant application also helped to protect worker health by lowering the concentrations of volatile organic compounds at the surface.[125]

But responders were concerned about the absence of information on the effects of dispersants in the deepwater environment. No federal agency had studied subsea dispersant use and private studies had been extremely limited.[126] BP's Hayward was less than helpful; he told a British newspaper, "The Gulf of Mexico is a very big ocean. The amount of volume of oil and dispersant we are putting into it is tiny in relation to the total water volume."[127] While federal officials did not possess the scientific information they needed to guide their choices, they had to make choices nevertheless.

From April 30 to May 10, scientists within Unified Command worked intensively to create a monitoring protocol for subsea dispersant use that would detect adverse environmental effects and provide criteria for when the use was appropriate. It was unclear whether the preauthorizations by the Regional Response Teams covered subsea dispersant use. EPA believed they did not and wanted to make decisions about such use at a high level within the agency. But it had trouble establishing clear and rapid communication, both internally and outside the agency.[128] This slowed creation and review of the testing protocols, while Coast Guard responders and NOAA scientists chafed at the delay.

On May 10, after several rounds of testing and revision, EPA adopted a testing protocol created by NOAA and BP scientists as its directive regarding subsea dispersant use. The directive, as later amended by EPA, limited subsea application to 15,000 gallons per day and required monitoring and compliance with environmental toxicity guidelines.[129] Administrator Lisa Jackson ultimately gave EPA's approval for subsea dispersant use and would later call it the hardest decision she ever made.[130] Observed toxicity levels never exceeded the guidelines in EPA's directive, and responders continued to apply dispersants at the source until BP capped the well.

Deploying the Containment Dome (May 6–8)

While scientists tried to determine if subsea dispersant use was even possible, BP engineers simultaneously worked to contain and recover oil until they could kill the well. Within days of discovering the leaks from the broken riser on the sea floor, they began to consider use of a large containment dome. The idea was to place the dome, also known as a cofferdam, over the larger of the two leaks, with a pipe at the top channeling oil and gas to the *Discoverer Enterprise*, a ship on the surface. BP already had several cofferdams, which it had used to provide safe working space for divers repairing leaks from shallow-water wells following Hurricanes Katrina and Rita.[131] By May 4, BP had finished modifying for deep-sea use and oil collection a preexisting dome that was 14 feet wide, 24 feet long, and 40 feet tall.[132] Following an MMS inspection of the *Discoverer Enterprise*, BP began to lower the 98-ton dome to the sea floor late in the evening of May 6.[133]

The likelihood of collecting oil with the cofferdam was uncertain. BP's Suttles publicly cautioned that previous successful uses had been in much shallower water.[134] BP recognized that chief among potential problems was the risk that methane gas escaping from the well would come into contact with cold sea water and form slushy hydrates, essentially clogging the cofferdam with hydrocarbon ice.[135] Notwithstanding the uncertainty, BP, in a presentation to the leadership of the Department of the Interior, described the probability of the containment dome's success as "Medium/High."[136] Others in the oil and gas industry were not so optimistic: many experts believed the cofferdam effort was very likely to fail because of hydrates.[137]

The effort did fail, for that reason. Although BP had a plan to deal with hydrates once the cofferdam was in place, it had not planned to mitigate hydrate formation during installation.[138] When crews started to maneuver the cofferdam into position on the evening of May 7, hydrates formed before they could place the dome over the leak, clogging the

opening through which oil was to be funneled.[139] According to Richard Lynch, a vice president overseeing the effort, BP never anticipated hydrates developing this early.[140]

Because hydrocarbons are lighter than water, the containment dome became buoyant as it filled with oil and gas while BP tried to lower it. BP engineers told Lynch that they had "lost the cofferdam" as the dome, full of flammable material, floated up toward the ships on the ocean surface. Averting a potential disaster, the engineers were able to regain control of the dome and move it to safety on the sea floor.[141] In the wake of the cofferdam's failure, one high-level government official recalled Andy Inglis, BP's Chief Executive Officer of Exploration and Production, saying with disgust, "If we had tried to make a hydrate collection contraption, we couldn't have done a better job."[142]

Inaccurate estimates of the well's flow also affected the cofferdam effort. According to Suttles, during this time, no one at BP believed the flow was greater than 13,000 to 14,000 barrels per day.[143] The government's then-current estimate of the flow was 5,000 barrels per day. The far larger volume of the actual flow—about 60,000 barrels per day, according to the government's now-current estimate—may be part of the reason hydrates formed more quickly than expected.[144] Moreover, BP had publicly predicted that the cofferdam would remove about 85 percent of the oil spilling into the sea.[145] But the ship it planned to connect to the cofferdam was capable of processing a maximum of 15,000 barrels per day.[146] While BP may have misjudged the probability of success, its decision to deploy the dome instead of another containment device appears to have turned more on timing than on perceived effectiveness: the dome was largely off-the-shelf and therefore ready to use in early May, before other equipment.[147]

With the failure of the cofferdam highlighting the shortage of viable options to contain and control the well, somewhat outlandish suggestions filled the void. In mid-May, a Russian newspaper suggested detonating a nuclear weapon deep within the well to stop the flow of oil, as the former Soviet Union had done on a number of occasions.[148] BP moved on: a little over a week after giving up on the cofferdam, on May 16, it was able to deploy a new collection device. Named the Riser Insertion Tube Tool, the device was a tube, four inches in diameter, that fit into the end of the riser and carried oil and gas up to the *Discoverer Enterprise*. This tool, BP's first effective means of containment, collected approximately 22,000 barrels of oil over its nine days of use.

Flow-Rate Estimates Creep Up (May 27)

After Unified Command announced its best estimate of the flow rate as 5,000 barrels per day on April 28, a number of independent scientists began to register their disagreement. BP had contacted scientists at the Woods Hole Oceanographic Institution on May 1 about undertaking diagnostic work on the BOP and measuring the flow using a remotely operated vehicle with sonar and acoustic sensors. But BP cancelled the Woods Hole project on May 6 to instead deploy the containment dome.[149] Based on satellite imagery of the surface slick, other non-government scientists arrived at estimates in late April and early May ranging from 5,000 to 26,500 barrels of oil per day.[150] Using the appearance of oil on the surface to assess flow from a source 5,000 feet below is inherently unreliable, but the outside scientists had no other data. That changed on May 12, when BP released

a 30-second video of oil and gas streaming from the end of the broken riser. Within 24 hours, independent scientists had seized on this information and published three new estimates of the combined flow of oil and gas that ranged from 20,000 to 100,000 barrels per day.[151] On May 18, BP released another video, this time of the leak at the kink. Combining estimated flow from the two sources, a non-government scientist, Steve Wereley, testified before Congress that approximately 50,000 barrels of oil per day were flowing into the Gulf.[152]

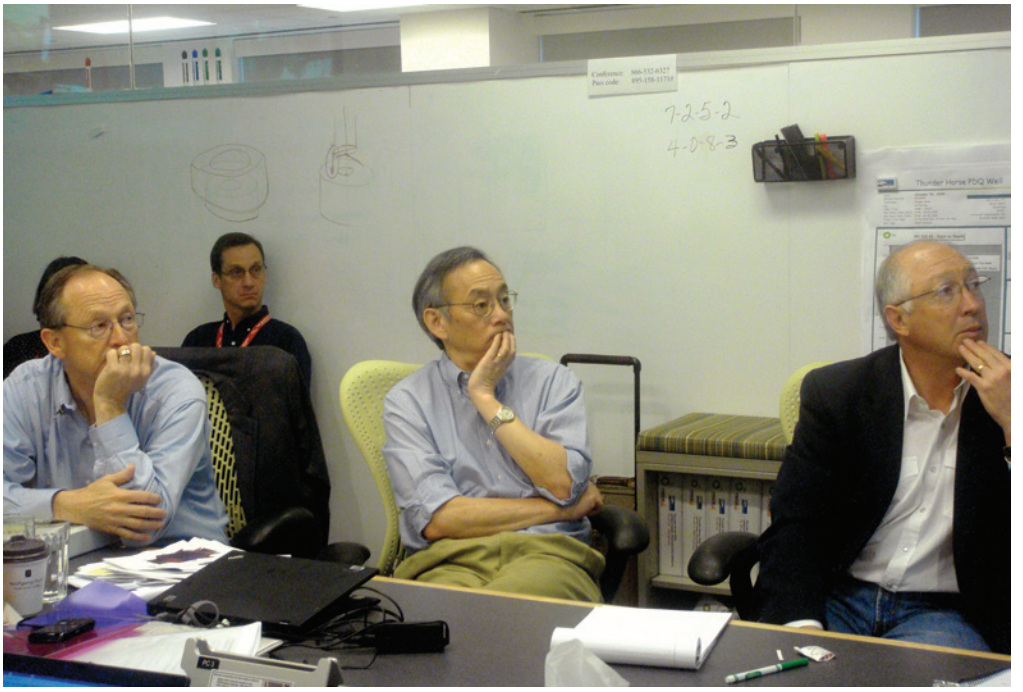
BP dismissed these new estimates, with spokesman Bill Salvin stating, "We've said all along that there's no way to estimate the flow coming out of the pipe accurately."[153] The government disagrees with Salvin's claim: according to Marcia McNutt, Director of the U.S. Geological Survey, if a similar blowout occurs in the future, the government will be able to quickly and reliably estimate the flow rate using the very oceanographic techniques that Woods Hole was prepared to use on May 6.[154*] At the time, the government responded to the independent estimates by devoting greater resources to the question of flow rate. On May 19, the National Incident Command created an interagency Flow Rate Technical Group and charged it with generating a preliminary flow rate as soon as possible and, within two months, a final estimate based on peer-reviewed methodologies. On May 23, at Secretary Salazar's recommendation, the National Incident Command appointed McNutt the leader.

The Group consisted of both government and non-government scientists, and included subgroups using different methodologies. It published its first estimate on May 27, stating: "The only range of flow rates that is consistent with all 3 of the methods considered by the [the Group] is 12,000 to 19,000 barrels per day. Higher flow rates [of up to 25,000 barrels per day] are consistent with the data considered by [one subgroup]."[155] The Group released little additional information about its calculations. A few days later, it issued a two-page report stating that the 12,000 to 25,000 barrel range represented the "lower bound" of one subgroup's estimates, and that this subgroup had chosen not to release its "upper bound" estimates, deeming them speculative because of "unknown unknowns."[156]

Responders uniformly contended that they were responding to the oil as it appeared on the water's surface, and that the problems with quantifying the flow from the source did not affect their ability to respond. In response to a congressional inquiry later in the summer about dispersant use, however, Admiral Allen indicated that early dispersant decisions were based on the 5,000 barrels per day figure, and that the higher estimate from the Flow Rate Technical Group "spurred responders to consider reassessing the strategy for the use of dispersants as well as other oil recovery methods."[157]

Later studies would conclude that 12,000 to 25,000 barrels a day was still a significant underestimate of the amount of oil streaming into the Gulf.

* At the behest of the Coast Guard, Woods Hole used its sonar and acoustic technology on May 31 to gather data that later yielded a flow-rate estimate of 58,000 barrels per day. On June 21, Woods Hole, again with the support of the Coast Guard, collected source samples, which initially demonstrated that 43.7 percent of the total flow was oil, while the remainder was gas. (Woods Hole has since revised this figure to 42.8 percent.)



Top government officials work on source control out of BP's Houston headquarters. At center is Secretary of Energy Steven Chu, flanked by Secretary of the Interior Ken Salazar (right) and Director of Sandia National Laboratories Tom Hunter.

Unified Area Command, Deepwater Horizon Response

The Top Kill and Junk Shot (May 26–28)

Throughout May, the federal government increased its presence in Houston, the hub of the well-control effort. In early May, scientists and engineers from three Department of Energy national laboratories began to work on-site with BP on containment. On May 7, Secretary Salazar asked McNutt, who had traveled to the Gulf with him on May 4, to remain in Houston. Finally, on May 10, President Obama directed Secretary Chu to form a team of government officials and scientists to work with BP on source control.[158] On May 11, Secretary Chu called several prominent scientists and asked them to join him the next morning for a meeting in Houston.[159]

The May 12 meeting signified the beginning of an oversight role for Secretary Chu and his team of science advisors. Secretary Chu is a Nobel Prize–winning physicist who had previously directed the Lawrence Berkeley National Laboratory, where he had led an effort to expand research into synthetic biofuels.[160] Though well known for his wide-ranging intelligence, Secretary Chu was not an oil and gas or drilling expert. During the following weeks, he immersed himself in the finer points of petroleum engineering and became intimately involved in decisionmaking with respect to containment of the well.

Although they were highly respected within their fields of study, the members of the advisory team had limited experience with well control and varying levels of experience with petroleum engineering generally. Secretary Chu assumed—correctly—that BP had

already hired a host of containment experts, and he wanted advisors known for creative thinking. His principal deputy on the team, Tom Hunter, was about to retire from his position as Director of Sandia National Laboratories. Along with McNutt, Hunter served as a link between the on-site government scientists and engineers and the rest of Secretary Chu's science advisors, who were for the most part based elsewhere. Another team member, Richard Garwin, helped design the world's first hydrogen bomb and had worked to extinguish oil fires in Kuwait following the first Gulf War. Alexander Slocum, an MIT professor who holds about 70 patents, had done some previous work on drilling design. George Cooper had been the head of the Petroleum Engineering Program at the University of California, Berkeley.

The role of both the national laboratories scientists and Secretary Chu's advisors took time to evolve from helping BP diagnose the situation—for instance, using gamma-ray imaging to show the position of the BOP's rams—to substantively overseeing BP's decisions on containment. In part, this was because the Secretary of Energy, his team of advisors, and the national laboratories personnel lacked a formal role within Unified Command. Their supervision was informally grafted onto the command framework.

In addition, the national laboratories team did not immediately integrate itself into the existing source-control structure, led by MMS and the Coast Guard. While MMS, the Coast Guard, and McNutt worked out of offices on the third floor of BP's Houston headquarters, the national laboratories team sat on the eighteenth floor.[161] One MMS staff member who was in Houston from late April through early July said that he never interacted with the national laboratories team: they never reached out to him, and he had no idea what they were working on. Perhaps because the lines of authority were unclear, BP's sharing of data with the government science teams was uneven at first. BP gave information when asked, but not proactively, so government officials had to know what data they needed and ask for it specifically.[162] Finally, both the national laboratories team and the science advisors had to educate themselves on the situation, and on deepwater petroleum engineering, before they knew enough to challenge BP and participate in high-level decisionmaking.[163]

With more substantive government oversight on the way but not yet in place, BP moved toward its first attempt to kill the well completely, via procedures called the "top kill" and "junk shot." Those names were fodder for late night comics: Jay Leno suggested that the top kill "sound[ed] like some bad Steven Seagal movie from the '80s."[164] In fact, both procedures are standard industry techniques for stopping the flow from a blown-out well (though they had never been used in deepwater[165]). A top kill—also known as a momentum or dynamic kill—involves pumping heavy drilling mud into the top of the well through the BOP's choke and kill lines, at rates and pressures high enough to force escaping oil back down the well and into the reservoir. A junk shot complements a top kill. It involves pumping material (including pieces of tire rubber and golf balls) into the bottom of a BOP through the choke and kill lines. That material ideally gets caught on obstructions within the BOP and impedes the flow of oil and gas. By slowing or stopping the flow, a successful junk shot makes it easier to execute a top kill.

BP's top-kill team began work in the immediate aftermath of the initial efforts to trigger the BOP.[166] In planning the operation, both BP and federal engineers modeled different scenarios based on different rates at which oil might be flowing from the well. National laboratories engineers used the then-current flow-rate estimate of 5,000 barrels per day.[167] Paul Tooms, BP's Vice President of Engineering, recalled that given the planned pumping rates, the top kill was unlikely to succeed with flow rates greater than 15,000 barrels of oil per day.[168] A senior administration official similarly recalled being told by a BP engineer that the top kill would not work if the flow rate exceeded 13,000 barrels per day.[169]

With the approval of the Federal On-Scene Coordinator, the top kill began on the afternoon of May 26. Secretary Chu and some members of his science team were in the command center in Houston.[170] During three separate attempts over three consecutive days, BP pumped mud at rates exceeding 100,000 barrels per day and fired numerous shots of junk into the BOP.[171] During each effort, pressures within the well initially dropped, but then flattened, indicating that the top kill had stopped making progress.[172] After the third unsuccessful attempt, BP and the government agreed to discontinue the strategy.[173]

As with the cofferdam, BP struggled with public communications surrounding the top kill. At the time, both industry and government officials were highly uncertain about the operation's probability of success. One MMS employee estimated that probability as less than 50 percent, while a BP contractor said that he only gave the top kill a "tiny" chance to succeed.[174] But BP's Hayward told reporters, "We rate the probability of success between 60 and 70 percent."[175] After the top kill failed, that prediction may have lessened public confidence in BP's management of the effort to control the well.

The Federal Role Increases (Late May)

By late May, the competence and effectiveness of the federal response was under assault. Polls showed that 60 percent of adults thought the government was doing a poor job of handling the spill.[176] News articles chronicled local anger that BP appeared in charge of clean-up efforts.[177] The government's estimate of the flow rate was climbing and, with the failure of the top kill, no end to the spill was in sight.

On May 28, President Obama made his second trip to the region to see response efforts and meet with state and local leaders. Plaquemines Parish President Billy Nungesser would later claim, incorrectly, that he had not been invited to this important meeting.[178] He told the *Plaquemines Gazette* that he had smuggled himself and another Parish President across bays and bayous and through an armada of state boats, gaining access only after threatening to call Anderson Cooper.[179]

The meeting with the President occurred at the Coast Guard station in Grand Isle, Louisiana, and included, among others, Governor Jindal, Florida Governor Charlie Crist, Alabama Governor Bob Riley, Louisiana Senators David Vitter and Mary Landrieu, Louisiana Congressman Charlie Melancon, New Orleans Mayor Mitch Landrieu, Lafourche Parish President Charlotte Randolph, and Parish President Nungesser.[180] President Obama emphasized the seriousness with which the government was treating the spill, announcing at a press conference after the meeting that he would triple the federal manpower and

equipment involved in the response.[181] Though Coast Guard responders believed they were already dedicating every available resource to the spill, and did not see across-the-board "tripling" as the best use of resources, they dutifully attempted to triple the personnel engaged and boom deployed. They chronicled their progress in Louisiana in a report titled "Status on Tripling."[182]

Under fire, President Barack Obama meets with dissatisfied state and local officials in Grand Isle, Louisiana on May 28, during his second visit to the Gulf since the spill began. Visible clockwise from the President: Plaquemines Parish President Billy Nungesser, Louisiana Governor Bobby Jindal, New Orleans Mayor Mitch Landrieu, Grand Isle Mayor David Camardelle, and Florida Governor Charlie Crist.

While in Grand Isle, President Obama also received an "earful" about Louisiana's proposal to build massive offshore sand berms as a physical obstacle to oil, which the National Incident Command had declined to approve in its entirety.[183] Parish President Nungesser, seated immediately to the President's left, was the first attendee to speak at the meeting and was adamant about the need for the entire berms project. Governor Jindal echoed him. In line with the federal government's effort to be more responsive to local demands, President Obama turned to Admiral Allen and asked him, in front of the berms' strongest proponents, to figure out a solution.[184]

The "tripling" order and promise to promptly reevaluate the berms project were only two of many actions at the end of May by which the federal government attempted to demonstrate its focus on the *Deepwater Horizon* disaster and commitment to the communities in the Gulf. The President signed the Executive Order creating this Commission on May 21.[185] On May 27, he announced a moratorium on offshore deepwater drilling and held a press conference about the administration response.[186] The same day, Elizabeth Birnbaum, the head of MMS, resigned—"on her own terms and on her own volition," according to Secretary Salazar.[187] Most symbolically, the federal government stopped holding joint press conferences with BP. From June 1 on, Admiral Allen gave his own daily press briefing.[188] But local officials continued to attack the adequacy of the federal response and to assert that that BP was running the response effort.

The Battles over Boom and Berms (May to June)

While the response had many dimensions, local communities fixated on the deployment of boom to prevent oil from washing ashore. Although not the most effective response tool, boom is a measurable, physical object that visibly stops oil. Residents could not see source-control efforts on the ocean floor or skimming far out in the Gulf, but they could see boats laying ribbons of bright orange or yellow floating boom to protect their shorelines. According to one Terrebonne Parish resident, boom was eye candy—seeing it gave him a sense of satisfaction (even if it did not do much).[189]

The Moratorium

On May 27, after a 30-day interagency examination of deepwater drilling operations, Secretary Salazar directed MMS to issue a six-month moratorium on all drilling at a water depth of more than 500 feet in the Gulf of Mexico and the Pacific Ocean. Department officials justified the moratorium as providing time for this Commission to do its work and for MMS to undertake needed safety reforms. The moratorium took effect on May 30 and halted work on 33 offshore deepwater rigs in the Gulf.

The oil and gas industry, local communities, and elected officials from the region immediately criticized the action. Senator Landrieu testified before this Commission in July that the moratorium was "unnecessary, ill-conceived and has actually created a second economic disaster for the Gulf Coast that has the potential to become greater than the first." On July 30, BP established a $100 million charitable fund to assist rig workers experiencing economic hardship because of the moratorium.

The federal government concluded that the moratorium's impact would be less severe. On September 16, a federal interagency report stated that the moratorium "may temporarily result in up to 8,000 to 12,000 fewer jobs in the Gulf Coast," with these losses attributed mostly to small businesses. Louisiana elected officials criticized the report's methodology and the decision to conduct this analysis after, instead of before, the moratorium began.

A group of companies that provide support services for deepwater drilling vessels challenged the moratorium in federal district court in Louisiana. On June 22, the court ruled that the moratorium violated the Administrative Procedure Act and enjoined its continued enforcement. The federal government asked the Fifth Circuit Court of Appeals to stay the district court's ruling, but the Fifth Circuit denied that request on July 8. The Department of the Interior then issued a revised moratorium on July 12, which limited drilling based on the equipment a rig used rather than the depth of the wellhead. Neither the first nor the second moratorium provided a company with the option of avoiding the bar on drilling by proving the safety of its rig operations to the government. A second group of offshore support companies challenged the revised moratorium. Before the district court could rule on this new lawsuit, the Department lifted the moratorium on October 12, seven weeks ahead of its scheduled November 30 expiration.

On September 30, a few weeks before lifting the moratorium, the Department promulgated new regulations on topics such as well casing and cementing, blowout preventers, safety certification, emergency response, and worker training. Compliance with the new rules is a prerequisite for both shallow and deepwater drilling permits. Some companies called these new requirements a "de facto moratorium" because of the time needed to meet them and for the Department to verify compliance.

A vessel places containment boom in Louisiana's Barataria Bay. Hundreds of miles of boom were deployed along the Gulf coast, but politicians clamored for more of the highly visible barriers.

U.S. Coast Guard photo/Petty Officer 3rd Class Ann Marie Gorden

Boom became a symbol of federal responsiveness to local communities. NOAA scientists worked through the night, every night, to prepare oil trajectory forecasts for federal responders to review as they began their days.[190] Responders used those forecasts to plan their actions, including where to place boom. Federal responders thought that officials and residents complaining about lack of boom did not understand their strategy for deployment; officials and residents thought that federal responders were inattentive to local needs.[191] The National Incident Command was not deaf to these complaints and gave an unofficial order to "keep the parishes happy."[192] Coast Guard responders distributed many miles of boom according to political, rather than operational, imperatives. They felt hamstrung by the outrage that resulted when a parish or state felt slighted by allocation decisions, so they placed boom wherever they could.[193]

Every Governor wanted more boom. When the oiling risk was highest in Louisiana, the Coast Guard directed boom there. Governor Riley of Alabama contended that this decision left his state's shoreline in danger.[194] At a press conference in mid-May, Governor Jindal said that the containment boom provided to Louisiana by the Coast Guard and BP was inadequate, while local officials behind him held up pictures of oil-coated pelicans.[195] Florida Department of Environmental Protection Secretary Mike Sole told reporters, "A lot of the decisions about Florida are being made in Mobile." He said he had warned the Federal On-Scene Coordinator, "Florida is important. We have 770 miles of shoreline to protect. I'm concerned that we're not getting enough focus on Florida."[196]

The competition for boom occurred at the parish and town levels as well. St. Bernard Parish had its own contractor bring in boom; it then sought to make the Coast Guard purchase and deploy that boom locally.[197] Some parishes reportedly ordered boom directly from suppliers and told them to "send the bill to BP."[198] Lafourche Parish kept demanding more boom—until it realized that certain skimmers were more effective and began demanding those skimmers instead.[199] Unified Command struggled to track how much boom was deployed and where.

Initially, responders made booming decisions based on their knowledge of the region's geography, the location of environmentally sensitive areas, and NOAA's oil trajectory forecasts. The oil-spill planning documents did not lay out a specific booming map, because the coastal ecosystem, particularly in the marshes, frequently changes. Unified Command eventually brought the Parish Presidents together to review boom plans that each parish had created. Some were infeasible—for instance, requesting that boom be placed in tidal passes where currents would drive oil under the boom or else damage it. In addition to worrying about useless or unnecessary boom, responders were concerned that storms could blow it into delicate marsh habitat. They deployed boom based on local pressures only to pull it away during bad weather.[200]

Once parishes had boom, they did not want to let it go. On July 22, Parish President Nungesser threatened to blow out the tires of trucks carrying away boom as the Coast Guard prepared for Tropical Storm Bonnie. Though he claimed that he was joking, the FBI called to reprimand him.[201] Other Parish Presidents issued orders prohibiting the removal of response equipment from their parishes and threatened Coast Guard responders with arrest.[202] Officials asked responders to measure "feet of boom deployed"—a statistic that was time-consuming to generate and had little value in assessing response efforts.[203] All of these problems distracted responders from their focus on cleaning up the spill.

The boom wars never reached a resolution. Responders knew that in deploying boom they were often responding to the politics of the spill rather than the spill itself. And the miles of boom along the coastline still did not prevent oil from washing up on the shore.

The boom wars were relatively civil, however, compared to the struggle among the State of Louisiana, the Army Corps of Engineers, the National Incident Command, and, ultimately, the White House over berms. Reinforcing barrier islands had long been a component of Louisiana's and Plaquemines Parish's coastal restoration plans.[204] But by early May, Governor Jindal and Parish President Nungesser had seized on an idea (originally proposed by Deltares, a Dutch independent research institute, together with Van Oord, a Dutch dredging and marine contractor) to construct massive, linear sand berms along Louisiana's barrier islands for spill response, to guard the coastline from oil.[205] The berms project presented an opportunity for Louisiana to take the lead on a large-scale response measure—with BP footing the bill. Moreover, after the spill ended, the berms' purpose could "pivot" from response to coastal restoration.[206]

On May 11, Louisiana's Office of Coastal Protection and Restoration applied to the Corps for an emergency permit to construct berms to "enhanc[e] the capability of the islands to

Voices from the Gulf
"If I was a mom, what would I do?"

Michelle Rolls-Thomas/Associated Press

Sheryl Lindsay, Orange Beach Weddings, Orange Beach AL

When Sheryl Lindsay picked up the April 21 Mobile *Press-Register* and read the headline, "At least 11 workers sought after gulf rig explosion," she recalled, "My heart went out to the workers on that rig, the victims and their families. I couldn't believe what had happened." The newspaper reported that six of the *Deepwater Horizon* survivors had been flown to a Mobile, Alabama, trauma unit.

For six years, Lindsay had been president of Orange Beach Weddings, which coordinated and arranged "The Wedding of Your Dreams" on Alabama's Gulf Coast near the Florida line. Her offices on Perdido Boulevard overlooked the pristine white sand beaches of Orange Beach, Alabama—one of her firm's specialties was elegant beach ceremonies and festivities. Her busy season was starting, with 73 weddings booked for 2010. She worked with numerous contractors, from wedding planners and caterers to ministers and photographers. She knew that BP's Macondo well was now spewing oil; "But I never thought it would affect us here."

On April 30, the day after the U.S. Coast Guard declared the Macondo blowout a "spill of national significance," Lindsay was in her office when the phone rang. It was her first cancellation. "When the bride called to cancel, she said it was because of the spill. She didn't want her guests coming down to find oil on the beaches. She didn't want to come if they couldn't swim or eat the seafood. That's when I knew."

In the wake of the oil spill, "Every time the phone rang, all we got was another cancellation—or someone asking how bad it was down here. I became a counselor for these brides. Orange Beach is a popular spot for destination weddings, and many of my brides come from out of state. But if girls' weddings were still a few months out, they still had time to change plans and move the wedding somewhere else. A lot of girls asked me what they should do—they were worried about the smell, whether the guests could swim and the quality of the seafood." She continued, "This was their big day. It was tough. And you think, 'If I was a mom, what would I do?'"

"What's funny," Lindsay said, "is we only had about three bad weeks where oil was washing on shore and BP was staging clean-up on the beach. That was in June. The rest of the summer the beaches were pretty much clean but folks still didn't come down." As the spill gushed on, Lindsay began to realize she had no idea what the next year would look like, but it didn't look good. She did not think she could afford to renew her office lease. In 2009, she had taken out a small business loan from the local bank for $55,000 to expand her firm, but now she began to fear she could not meet those payments as her business diminished.

reduce the inland movement of oil from the BP Deepwater Horizon Oil Spill."[207] Colonel Alvin Lee, two months shy of the end of his three-year tour as the Commander of the Corps for the District of New Orleans, cancelled a long-scheduled vacation, and the Corps immediately sought comments on the proposal from relevant federal and state agencies.[208]

The patience of Louisiana officials quickly wore thin. On May 17, Governor Jindal's office summoned Colonel Lee to the New Orleans airport for a meeting that included three Parish Presidents, the Chairman of the Office of Coastal Protection and Restoration, the Adjutant General for Louisiana, and the Governor himself. The group's message to Colonel Lee was clear: approve the berms project, and do it quickly.[209] The entire Louisiana congressional delegation wrote Colonel Lee on May 20, to "implore [him] to immediately approve the emergency authorization request" for the Louisiana berms.[210] In a May 21 letter to President Obama, Senator Vitter asked the President to stop the "tragic bureaucratic stranglehold" and to "make this happen now."[211]

The Corps reviewed agency comments, conducted its own evaluation of the project, and engaged in dialogue with state officials. On May 27—just 16 days after it had received Louisiana's application—the Corps approved the issuance of an emergency permit for a significantly scaled-back berms project: six "reaches" totaling 39.5 miles in length.[212] During the review process, commenting agencies expressed skepticism that the berms could be constructed in time to be effective for spill response and concern that partially completed berms would do more environmental harm than good.[213] The Corps' job, however, was to analyze the "feasibility and environmental impacts" of the berms. The National Incident Commander had the task of determining whether the berms would be "effective. . . in combating the oil spill."[214] That determination was necessary to make BP pay for the project as a response measure.

The same day the Corps approved the six reaches, Admiral Allen authorized one of the six as a prototype oil-spill response mechanism.[215] Earlier in May, an interagency task force had advised the National Incident Command that the project would not be an effective spill-response measure, in part because the berms could not be constructed in time to fight the spill.[216] But public and political pressure had been unyielding. In an attempt to balance both sets of concerns, on May 22, Admiral Allen e-mailed an idea to his deputy: "What are the chances we could pick a couple of no brainer projects and call them prototypes to give us some trade space on the larger issue and give that to Jindal this weekend?"[217] Five days later, the National Incident Command announced its approval of one prototype berm, to cost $16 million.[218] The accompanying press release promised that additional berms could be constructed if the approved section proved effective. Building even one prototype segment would take months, however, and the segment would then need to be analyzed. Any further construction therefore would not begin until the fall.

But because of the meeting in Grand Isle on May 28, where Parish President Nungesser and Governor Jindal urged President Obama to approve the entire project, the National Incident Command would change course. At the meeting, the President turned to Admiral Allen and, in front of the assembled Governors and other leaders, asked him to assemble a group of experts to examine the merits of Louisiana's proposal as a spill-response measure.

Admiral Allen replied that this might take some time. It was the Friday afternoon before Memorial Day weekend. But the President pushed, asking, "Can you do it next week?" Admiral Allen, put on the spot, pledged to do his best.[219]

After the meeting, Governor Jindal immediately announced that the President had "agreed that work on the first segment must begin immediately" and that the federal government would decide "within two to three days" whether the additional five segments should proceed.[220] Parish President Nungesser told a similar story to Anderson Cooper on *CNN* that evening, saying "The President committed by early next week, we will have an answer and I believe that he's going to task BP."[221]

On June 1, Admiral Allen convened a summit in New Orleans "which included members of academia [one from Louisiana State University and a second from the University of New Orleans], federal trustees, fish and wildlife service and NOAA," as well as Governor Jindal and Parish President Nungesser. Although some experts at the summit expressed concern about causing harm to the environment, the discussion focused on the berms' potential to protect marshlands.[222] The politics of the project remained close at hand: Parish President Nungesser walked out, calling the meeting a "Dog and Pony Show,"[223] only to return in time to speak at the end. Governor Jindal continued to express his frustration and pressed for approval of all six reaches covered by the Corps permit.[224] In the face of the spill and in front of the Louisiana politicians, no one directly opposed the berms, and a "preponderance of opinion" at the summit suggested the berms would be an effective response measure.[225]

That evening, following the summit, Admiral Allen and BP's Hayward had dinner together in New Orleans to discuss the berms.[226] The following afternoon, Admiral Allen gave the go-ahead to all six reaches approved by the Corps, to be funded by BP.[227] BP estimated the cost to be $360 million, double the entire amount it had spent as of early June in "helping the region respond to the oil spill."[228] The Corps pegged the cost at $424 million.[229]

Louisiana awarded contracts for the project to Shaw Group, a Baton Rouge-based engineering, construction, and environmental services firm, and C.F. Bean LLC, a dredging contractor based in Plaquemines Parish.[230] Shaw estimated that five of the six berm reaches would be completed by November 1, and that the sixth would be completed by the end of November.[231] The National Incident Command estimated that the construction time for all six reaches would be six to nine months.[232] Even if those estimates had been correct, the project would have been nowhere close to complete by the time the government expected BP to kill the Macondo well with a relief well. As it happened, all of the estimates were far too rosy. Only a fraction of the planned reaches would be finished before the spill ended, and very little oil would be captured.

From Containment to Collection (Late May to Early July)

Following the unsuccessful top kill, BP teams in Houston met through the night of May 28 to assess the operation.[233] Some meetings occurred behind closed doors, without government participation. At one point, Herbst of MMS and Admiral Kevin Cook, who had been dispatched by Admiral Allen to be his representative in Houston, entered a meeting and stated that they had a right to be present. Apparently, government officials

had not previously insisted on joining these types of meetings, and BP personnel were surprised by the interruption.[234] The failure of the top kill marked a turning point for the government science teams, with the government significantly increasing its oversight of the containment effort.

The next morning, BP presented its analysis of why the top kill failed to stop the flow of oil. The analysis focused on the well's 16-inch casing, the outermost barrier between the well and the surrounding rock for more than 1,000 vertical feet. That casing was purposely fabricated with three sets of weak points, called rupture disks. During the well's production phase, the hot oil coursing through the production casing, which is inside the 16-inch casing, would lead to a buildup of pressure in the well. If the pressure buildup was too high, it could cause the collapse of one of the two casings. The disks were designed to rupture and relieve this potential buildup of pressure before a casing collapsed.

The disks could rupture in two ways. If pressure between the 16-inch casing and the production casing were too high, the rupture disks would *burst outward* before the production casing collapsed. If pressure outside the 16-inch casing were too high, the rupture disks would *collapse inward* before the casing itself collapsed.[235] Once ruptured, the disks would create small holes in the 16-inch casing, bleeding built-up pressure off into the rock. According to BP's top-kill analysis, pressures created by the initial blowout could have caused the rupture disks to collapse inward, compromising the well's integrity.[236] BP believed that the mud it had pumped down the well during the top kill could have gone out into the rock through the rupture disks, instead of staying within the well and pushing oil back down into the reservoir as intended.[237]

Collapse of the rupture disks was only one of BP's possible explanations for the unsuccessful top kill.[238] But the company presented it to the government as the most likely scenario.[239] Although the government science teams did not fully accept BP's analysis of what happened to the mud, they agreed that the rupture disks could have collapsed during the blowout, and that the integrity of the well had to be considered in future containment efforts.[240] In retrospect, government officials have suggested that the top kill likely failed because the rate at which oil was flowing from the well was many times greater than the then-current 5,000 barrels-per-day estimate. Because BP did not pump mud into the well at a rate high enough to counter the actual flow, oil and gas from the well pushed mud back up the BOP and out of the riser.[241]

BP had previously said that, if the top kill failed, its next step might be to install a second BOP on top of the existing one to shut in the well.[242] But now, the company engineers viewed the possibility that the rupture disks had collapsed as a reason to discard capping the well as an option.[243] If BP shut the well in, oil and gas could flow out the rupture disks and into the rock surrounding the well in a "broach" or "underground blowout." From there, the hydrocarbons could rise through the layers of rock and flow into the ocean from many points on the sea floor. This would make containment nearly impossible, at least until the completion of a relief well. Thus, in the aftermath of the top kill, BP and the government focused on trying to collect the oil, with the relief wells still providing the most likely avenue for killing the well altogether.[244]

Transocean's huge drill ship the *Discoverer Enterprise*, its derrick towering 400 feet above the sea, and Helix's *Q4000* (foreground) sit over the gushing wellhead. Together the vessels were able to recover up to 25,000 barrels of oil per day.

Julie Dermansky ©2010

BP had a team ready to proceed with new collection tools almost immediately.[245] On May 29, the company and the government announced that BP would attempt to cut off the portion of the riser still attached to the top of the BOP and install a collection device—the "top hat"—which would then be connected via a new riser to the *Discoverer Enterprise* above.[246] BP began installing the device on June 1, and had the top hat in place and functioning by 11:30 p.m. on June 3. Having learned from its cofferdam experience, BP injected methanol to prevent formation of hydrates. By June 8, the *Discoverer Enterprise* was collecting nearly 15,000 barrels of oil per day.

BP also developed a system to bring oil and gas to the surface through the choke line on the BOP. BP outfitted the *Q4000*, a vessel involved in the top-kill effort, with collection equipment, including an oil and gas burner imported from France. After it became operational on June 16, the *Q4000* system was able to process and burn up to 10,000 barrels of oil per day.*

On occasion, BP was overly optimistic about the percentage of the oil it could remove or collect. On June 1, Suttles said that he expected the top hat, when connected to the *Discoverer Enterprise*, to be able to collect the "vast majority" of the oil.[247] Within days, it became apparent that the top hat and *Discoverer Enterprise* were inadequate. On June 6, Hayward told the *BBC* that, with the *Q4000* in place, "we would very much hope to be containing the vast majority of the oil."[248] But when the *Q4000* came online in mid-June, the two vessels' joint capacity of 25,000 barrels per day was still insufficient.

* Over the course of June and early July, BP worked on further expanding its containment system, which it asserted would eventually be able to collect up to 90,000 barrels of oil per day. BP never used the complete system, based around two freestanding risers connected to the choke and kill lines on the BOP, because it succeeded in capping the well on July 15.

It is unclear whether BP could have increased its collection capacity more rapidly than it did. BP's Lynch said that the speed at which the company brought capacity online was limited solely by the availability of dynamically positioned production vessels.* One senior Coast Guard official challenged BP's definition of availability: he suggested that BP did not consider options such as procuring ships on charter with other companies until the government pushed it to do so. Obtaining another production vessel might have enabled BP to collect oil through the BOP's kill line at a rate comparable to that of the *Q4000*.[249]

Continued Conflict about Dispersant Use (May 10–July 14)

Because of the insufficient collection capacity, oil continued to flow into the Gulf. Though the subsea use of dispersants proved helpful in preventing huge surface slicks, it did not initially have the predicted effect of reducing the total volume of dispersants applied. At a May 24 press conference, EPA Administrator Jackson announced that the government was instructing BP to "take immediate steps to significantly scale back the overall use of dispersants" and expressed EPA's belief that "we can reduce the amount of dispersant applied by as much as half, and I think probably 75 percent, maybe more."[250] A Coast Guard–EPA letter and joint directive issued two days later instructed BP to "eliminate the surface application of dispersants," except in "rare cases when there may have to be an exemption."[251]

Despite this directive, surface use of dispersants continued. When surveillance aircraft spotted oil and no other method of cleaning it up was available in the area, BP would ask for an exemption from the Federal On-Scene Coordinator, who would then seek EPA's approval. The Coast Guard could not unilaterally allow the exemption; EPA had the final vote.

EPA expressed frustration that BP sought regular exemptions, and it repeatedly asked for more robust explanations of why BP could not use mechanical recovery methods, such as skimming and burning, instead of dispersants.[252] Coast Guard responders, who viewed dispersants as a powerful tool to protect the coastline, wondered why EPA wanted to cast aside the advance planning that went into the preauthorization of surface dispersant use.[253]

These different perspectives on dispersants led to conflicts between EPA and the Coast Guard. For example, on June 7, BP requested permission to spray dispersants on several large slicks. Despite Federal-On Scene Coordinator Rear Admiral James Watson's statement that he had "determined aerial dispersant the best and only way to mitigate the pending landfall effect of the oil spotted," EPA would not approve the exemption.[254] The Coast Guard captain leading the majority of front-line operations was furious. "It would be a travesty," he wrote, "if the oil hits the beach because we did not use the tools available to fight this offshore. This responsibility needs to be placed squarely in EPA's court if it does hit the shoreline."[255] Later that day, without having received responses to its requests for additional data, EPA threatened to issue a directive "to stop the use of all dispersants."[256]

* Dynamically positioned vessels have computer-controlled systems that maintain the vessel's exact position and direction, despite external factors such as wind, waves, and current.

The working relationship between the agencies improved over time, with more complete justifications for dispersant use included in the daily requests for exemptions.[257] But disagreements came to a boil again in mid-July. By this point, EPA had finally installed a senior official, Assistant Administrator for Solid Waste and Emergency Response Mathy Stanislaus, on the ground at Unified Area Command.[258] On July 13, BP's head of dispersant operations made a request to apply 10,000 gallons to slicks.[259] The request ultimately went to Stanislaus, who denied it, noting that skimming in particular had been extremely effective over the past few days.[260] The Federal On-Scene Coordinator (by this time Rear Admiral Paul Zukunft) replied that he could not "take the dispersant tool out of my kit when" oil threatened to hit environmentally sensitive areas in Louisiana. "We spent over a month cleaning Barataria Bay with over 1500 people and 600 vessels," he added, "and still incurred significant wildlife kills while exposing these clean-up crews to extreme heat conditions. That is the trade-off option where dispersants come into play. . . ."[261] The back-and-forth continued, with BP ultimately prohibited from using dispersants on July 14.[262] The capping of the well the next day tabled the conflict.

Months later, Admiral Allen and Administrator Jackson would say that they had cooperated closely, nearly attained the goal of a 75 percent reduction in dispersant use, and were satisfied with the use of dispersants to mitigate the spill.[263]

The Well Is Finally Capped (Late June to July 15—and Beyond)

Meanwhile, in Houston, the government continued to develop a more effective structure for oversight of well control. The basic elements of the structure were in place by mid-May, and the roles of the different government teams were better defined by mid-June. MMS and the Coast Guard continued to focus on identifying hazards in BP's technical procedures; personnel from the national laboratories and the U.S. Geological Survey provided information and analyses to the science advisors and BP; and the science advisors conducted their own independent analyses and helped inform the government's ultimate decisionmakers, including Secretary Chu, Secretary Salazar, McNutt, Hunter, Carol Browner (Director of the White House Office of Energy and Climate Change Policy), and Admiral Allen.[264]

Following the failure of the top kill, BP began presenting its source-control plans for review by these government teams. The science advisors would question BP's assumptions, forcing it to evaluate worst-case scenarios and explain how it was mitigating risks.[265] The government saw its pushback as essential because BP would not, on its own, consider the full range of possibilities.[266] According to one senior government official, before the increased supervision, BP "hoped for the best, planned for the best, expected the best."[267] BP often found the supervision frustrating. Tooms, BP's Vice President of Engineering, believed that the government science advisors unnecessarily slowed the containment effort, arguing that scientists consider risk differently than engineers and that BP had expertise in managing risk.[268] BP, however, was not in the best position to tout that expertise: its well had just blown out.

In mid- to late June, the government teams also began to seek more frequent input from other oil companies, primarily through large conference calls of 30 or more people.

Although BP had previously turned to others in industry for advice, it had generally asked discrete questions about aspects of source control. The government teams, by contrast, asked other companies to comment on BP's overall plans and to help force BP to consider contingencies. BP, which believed its competitors suffered from a conflict of interest, did not appreciate the increased industry involvement. After one meeting in which BP's competitors aggressively challenged its plans, BP refused to meet with them again, forcing the government teams to schedule separate meetings.[269]

The conference calls were somewhat disorganized, with no agenda and participants sometimes not knowing who was speaking. One industry participant recalled an instance when he was chagrined to learn he had been talking to Secretary Chu without realizing it.[270] A senior government official noted that some colleagues viewed BP's conflict-of-interest concerns as valid and took the competitors' advice "with a grain of salt."[271] But government personnel generally found the industry participation helpful.

The science advisors' oversight increased substantially during June. On June 18, Secretary Chu sent an e-mail to the advisory team as well as some national laboratories scientists, describing their expanded role. The e-mail cited a scene from the classic World War II movie *The Guns of Navarone*, and quoted the character played by Gregory Peck: "[Y]our bystanding days are over! You're in it now, up to your neck! They told me that you're a genius with explosives. Start proving it!" Recognizing that there were "[p]robably no shaped charges to be used on this mission," Secretary Chu wrote that "the rest rings true." He enclosed a directive that Admiral Watson, the Federal On-Scene Coordinator, would issue the next day, formally requiring BP to submit any "pending decision" on containment to the government "for review."[272]

The role of the science advisors and the on-site scientists increased just as the source-control effort approached a critical phase. By late June, BP was well on its way toward deploying a "capping stack," which, once installed on top of the BOP, would enable BP to shut in the well. The capping stack was essentially a smaller version of a BOP, similarly designed to stop the flow of oil and gas. BP had internally discussed installing a tight-sealing cap within a week of the blowout.[273] Following the top kill, however, BP and the government had shelved the idea of shutting in the well, in part because of concerns that the rupture disks in the well's 16-inch casing had collapsed, potentially allowing oil to flow out of the well into the rock. The government and BP had to take these concerns into account when planning for use of the capping stack.

Secretary Chu and Hunter briefed the President on the capping stack in late June or early July, and he approved its use. The government appears to have delayed installation for a few days, however, to continue analyzing the significant risks of shutting in the well.[274] One critical analysis involved the geology surrounding the Macondo well. The government's scientific Well Integrity Team concluded that it would take a total of approximately 100,000 barrels of oil flowing through the rupture disks into the surrounding rock for oil to create paths through the rock to the sea floor. The Team further concluded that such paths were likely to close or "heal" *if* BP and the government detected oil flow into the rock and reopened the capping stack with sufficient speed. To spot any

Voices from the Gulf

"This unnatural, unnatural catastrophe. . . ."

The Louisiana Seafood Marketing and Promotion Board

Al & Sal Sunseri, P&J Oyster Company, New Orleans, LA

Al and Sal Sunseri are co-owners of P&J Oyster Company, their family's 134-year-old business in the French Quarter of New Orleans. P&J processes and sells some 60,000 Louisiana oysters to the city's best restaurants and local oyster bars on a typical day. When Al first heard about the *Deepwater Horizon* rig accident, he recalled thinking, "'What a terrible thing for those people.'" He added, "I didn't think more about it because the Coast Guard and everyone said it would be limited."

Al's routine remained unchanged in the days after the *Deepwater Horizon* blowout and fire: early mornings bustling with deliveries, the din of his skilled shuckers pounding and prying open oysters, preparing orders. Then, on Saturday, April 24, the Sunseris and the rest of America heard that oil was leaking from the rig's broken riser. With each passing day, the news only got worse.

P&J oysters are an institution in New Orleans, a celebrated brand proudly listed on local menus as a promise of taste and quality. P&J specializes in Louisiana oysters; most of their suppliers farm in the Barataria Basin, west of the Mississippi River. P&J had survived floods, the Great Depression, and even Hurricane Katrina. But now, the Sunseri family and the staff were all at the mercy of a runaway oil spill, with no end in sight.

Throughout May, the Macondo well gushed on unchecked, and by early June, the government had closed Louisiana oyster beds. The Sunseris had taken over from their father 25 years earlier. Now, for the first time, they had to lay off 11 skilled shuckers. "These ladies here, those guys—I grew up with them," Al said. "We were in our twenties when we started." Longtime employee Wayne Gordon, 42, had been shucking at P&J since he was 18: "Twenty-four years. I cannot imagine not being here." As the shuckers worked their way through what was to be the final pile of succulent Louisiana shellfish, the owner of a nearby restaurant appeared with a breakfast buffet of scrambled eggs, fried ham, grits, and biscuits. "After a funeral, we bring food," said the restaurateur, a longtime customer.

Al's son Blake, 24, has spent the past three years learning the business, intent on becoming the sixth family generation to run it. "This is a real devastating event for me," he said. "This is my home, it feels like I don't really have a say in what's going on around me." He could have been speaking for millions of his fellow Americans, all along the Gulf of Mexico coast, who suddenly found themselves and their worlds facing ruin from what his uncle, Sal, called "this unnatural, unnatural catastrophe."

problem quickly enough to avoid lasting damage, the Team recommended monitoring shut-in pressure at the BOP as well as visual, seismic, sonar, and acoustic data.[275] Because shutting the capping stack would increase the pressure inside the well, the government was also concerned about bursting either the rupture disks (if they had not already collapsed) or another weak point in the casings. One industry executive recalled discussing this issue on a conference call with the science advisors; he expressed his view that allowing the pressure to climb above the level recorded during the top kill would be traveling into uncharted territory, with uncertain risks.

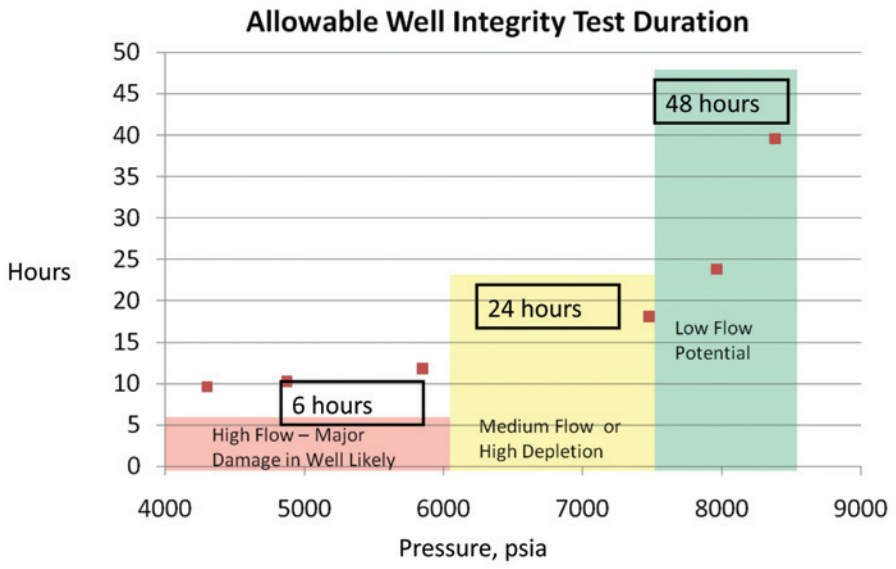
On July 9, as analysis of these risks continued, Admiral Allen authorized BP to install the capping stack, but not to close it.[276] The extremely complicated operation began the next day. After removing the top hat from the top of the riser, remotely operated vehicles had to unbolt the stub of riser connected to the top of the *Deepwater Horizon* BOP stack, remove this stub, look for any pieces of drill pipe sticking up through the top of the BOP stack, slide the capping stack into place, and bolt it to the BOP stack. The process went smoothly, and BP finished installing the capping stack without incident by July 12. Suttles described this installation as the best operation of the entire source-control effort.[277]

BP next prepared to temporarily close the capping stack in a planned "well integrity test," to determine whether the well had been compromised and oil could flow into the rock formation. In a July 12 letter, Admiral Allen formally authorized the test to begin.[278] But it did not. About two hours before the test was supposed to start, the government teams met with BP and industry representatives, including from Exxon (in person) and Shell (by phone). Secretary Chu and Admiral Allen were both present in person. BP faced significant criticism of the wisdom of attempting the test, with Exxon and Shell raising concerns associated with shutting in the well that had yet to be considered by BP or the government.[279] In the most extreme scenario, one industry expert suggested that an underground blowout could cause the sands around the wellhead to liquefy and the entire BOP to disappear into the sea floor.[280] Because Secretary Chu and the science advisors believed that these risks required further study, Admiral Allen delayed the test to allow for 24 hours of additional analysis.[281]

Overnight, the government science teams reached out to industry and academia for help. By 10:00 the next morning, experts had reassured the government that catching a leak early enough would prevent catastrophic consequences.[282] With the government teams satisfied, Admiral Allen reauthorized the well integrity test. The test was to last from 6 to 48 hours, and BP had to monitor pressure, sonar, acoustic, and visual data continuously, as recommended by the Well Integrity Team.[283] Secretary Chu required BP to dedicate two remotely operated vehicles to visually monitor for leaks at the wellhead.

Although the Well Integrity Team had calculated that it would take a leak of approximately 100,000 barrels for oil and gas to reach the sea floor, the government was prepared to permit a leak of only 20,000 barrels before requiring the capping stack to be reopened.[284] Using an estimate for the expected pressure at shut-in derived from BP's modeling of the reservoir, the Team developed guidelines for the length of the test.[285] If the pressure at shut-in was less than 6,000 pounds per square inch, major well damage was likely—BP would

FIGURE 5.1: Protocol for Well Integrity Test



▪ Duration (in hours) calculated by National Labs flow analysts using estimated flow rates at varying BOP (PT-B) pressures and maximum allowable flow into formation of 20,000 bbls.

have to terminate the test within six hours and reopen the well. If the shut-in pressure was greater than 7,500 pounds per square inch, the risk of a leak was low, and the test could proceed for the full 48 hours. Finally, if the shut-in pressure was between 6,000 and 7,500 pounds per square inch, the risk of a leak was uncertain—either there was a medium-sized leak or the reservoir was highly depleted. Under this scenario, the test could proceed for 24 hours. (See Figure 5.1.) If the pressure was too high, there was also the risk of causing a new rupture.

After a 24-hour delay to repair a minor leak, BP shut the stack and began the well integrity test at about 2:25 p.m. on July 15.[286] For the first time in 87 days, no oil flowed into the Gulf of Mexico. Initial wellhead pressure readings were just over 6,600 pounds per square inch—in an uncertain middle range that one senior administration official termed "purgatory"—and rising slowly.[287] Later that afternoon, the science advisors, including McNutt and Hunter, met with Secretaries Salazar and Chu to determine whether to keep the well shut in. Based on the early pressure data, the group appears to have been firmly in favor of reopening the well. Garwin, who had opposed even undertaking the well integrity test, voiced the strongest opinion, arguing BP ought to stop the test immediately and wondering whether it was already too late. No one at the meeting appears to have argued in favor of keeping the well closed.[288]

Following the science team meeting, Admirals Allen and Cook, Browner, Secretaries Chu and Salazar, and McNutt had a series of conversations to determine how to proceed. Keeping the capping stack shut could cause an underground blowout and, in the worst case, loss of a significant portion of the 110-million-barrel reservoir into the Gulf.[289] This risk had to be balanced against the benefit of stopping the spill, a continuing

environmental disaster. The government decisionmakers recognized that the public wanted the well plugged and the flow of oil into the Gulf stopped, but the risk of causing greater harm was real.

Admiral Cook made the argument that eventually prevailed. He reminded the others that, before the test began, BP and the government had considered the possibility of pressure measurements like those being observed. Both had agreed that, in such a case, the test should last 24 hours, with consultation between the parties before reopening the well.[290] The government leaders decided that they should follow this protocol: the stack would stay closed overnight.

This additional time proved critical. Using a single cell-phone photograph of the plot of initial pressure readings, Paul Hsieh, a U.S. Geological Survey scientist then in Menlo Park, California, worked overnight to develop an explanation of the results of the test, including the lower-than-expected shut-in pressure. Pre-test expectations had been based on an incomplete understanding of the reservoir's geometry and on pressure readings from a single gauge at the bottom of the BOP, which was only accurate to plus or minus 400 pounds per square inch and functioning sporadically. At the government's behest, BP had equipped the capping stack with pressure gauges.[291] Following the shut-in of the well, those gauges provided accurate pressure data for the first time. Using that data along with a flow-rate estimate of 55,000 barrels per day and BP's estimate that the reservoir contained 110 million barrels of oil, Hsieh was able to generate a model that predicted the observed shut-in pressure without having to assume a significant oil and gas leak into the rock formation.[292]

The next morning, the government principals and the science advisors—who had been convinced that reopening the stack was necessary—hosted a meeting. Both BP and Hsieh made presentations explaining the observed pressures at shut-in, with BP arguing that the well should remain capped.[293] Participants had different recollections as to whether Hsieh's or BP's presentation carried more weight. But the outcome of the meeting was clear: the stack would stay shut, with the government reevaluating that decision every six hours.

While it went unrealized at the time, a critical point had passed. As intense monitoring of the area around the wellhead continued over the next several days, Hsieh's model continued to predict the behavior of the well, and a leak into the formation became progressively less likely.[294] Although the well integrity test had originally been scheduled to last a maximum of 48 hours, Admiral Allen began to extend it in 24-hour increments beginning on July 17. At his July 24 press briefing, he stated what was by then plain: "our confidence [in the capping stack] is increasing and we have better integrity in the well than we may have guessed."[295]

Meanwhile, on July 19, BP publicly raised the possibility of killing the well before completing a relief well, through a procedure called a "static kill."[296] Like the top kill, the static kill involved pumping heavy drilling mud into the well in an effort to push oil and gas back into the reservoir. But because the oil and gas were already static, the pumping rates required for the static kill to succeed were far lower than for the top kill.

The primary concern with the static kill was the pressure it would put on the well. On July 28, BP received an unsolicited letter from Pat Campbell, a Vice President at Superior Energy Services, which owned BP contractor Wild Well Control, recommending in no uncertain terms that the static kill not proceed. Campbell, who had worked with legendary well-control expert Red Adair, reiterated a point already raised by others in the industry: that the only pressure the well could withstand for certain was the current shut-in pressure (approximately 6,920 pounds per square inch at the time he wrote).[297]

Despite these issues, after some delays caused by weather and work on the first relief well, the government approved the plan for the static kill on August 2.[298] A mud injection test began on August 3, and pressure at the wellhead increased only slightly before beginning to drop.[299] Based on the positive results of the test, BP began slowly pumping more drilling mud into the well later that same day. By 11:00 p.m., the static kill had succeeded.[300] The following evening, Admiral Allen authorized BP to follow the mud with cement.[301] BP finished cementing the next day. On August 8, Admiral Allen reported that the cement had been pressure-tested and was holding.[302]

The Fate of the Oil (August 4)

On August 4, the same day it announced the static kill's success, the federal government released a 5-page report titled *BP Deepwater Horizon Oil Budget: What Happened to the Oil?*, as well as a 10-page supporting document titled *Deepwater Horizon MC252 Gulf Incident Oil Budget*.[303] The "Oil Budget" provided the government's first public estimate of the total volume of oil discharged during the spill—roughly 4.9 million barrels. The government arrived at this number using its current flow-rate estimate, which ranges from 62,200 barrels per day on April 22 to 52,700 barrels per day on July 14, just before the capping stack stopped the flow.[304] * The Oil Budget also described the efficacy of different response methods.

The Oil Budget was originally an operational tool, intended as a guide for responders, not as the basis for a scientific report on what happened to the oil. Nonetheless, in late July, the White House decided to publicly release the Oil Budget and asked NOAA to take the lead on drafting a short report to introduce the tool.[305] The Budget cleared the interagency review process in time for its August 4 release.†

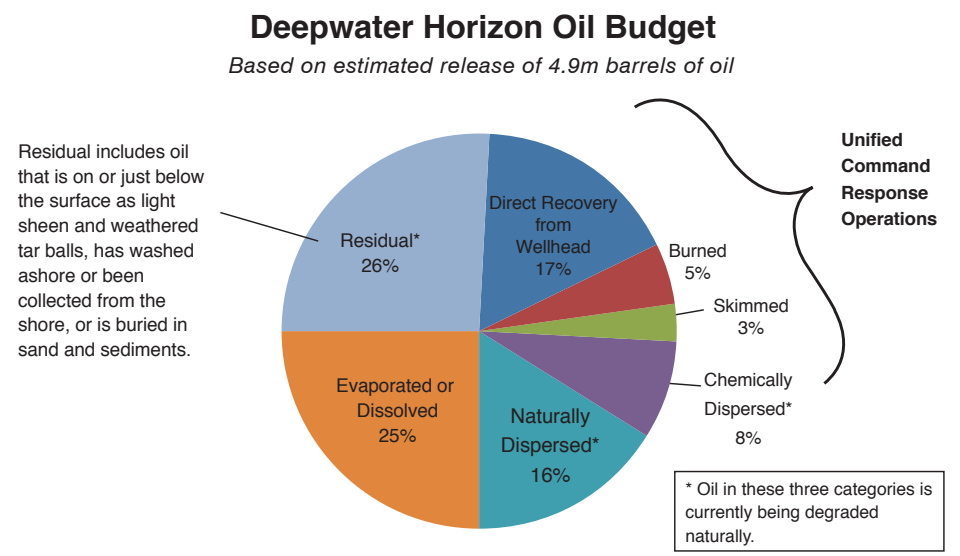
The White House's Browner appeared on six morning newscasts on August 4 to discuss both the successful static kill and the Oil Budget report. On *NBC*, *MSNBC*, and *ABC*, she told viewers that, according to the report, "the vast majority," or approximately three-quarters, of the oil "is gone" or "appears to be gone."‡ The Budget, however, did not

* The government's estimate, which is current as this report goes to press, has an uncertainty factor of ±10 percent. It is the Commission's understanding that the government's Flow Rate Technical Group will issue a final report in January 2011. In a peer-reviewed paper published in *Science Express* on September 23, 2010, Timothy Crone and Maya Tolstoy of Columbia University's Lamont-Doherty Earth Observatory estimated that the total release was roughly 5.2 million barrels—slightly higher than the government's estimate. While BP has not released its own flow-rate figures, it has suggested that the government's estimate of the total amount of oil released from the Macondo well is 20 to 50 percent too high.

† During the review process, EPA expressed concerns about the pie chart's potential to obscure the uncertainty of the government's estimates. Lisa Jackson, e-mail to Jane Lubchenco, July 31, 2010. For example, EPA recommended that NOAA combine chemically and naturally dispersed oil into a single category because there was not enough information to accurately distinguish between the two mechanisms. Bob Perciasepe, e-mail to Jane Lubchenco and others, July 31, 2010; Bob Perciasepe, e-mail to Stephen Hammond and others, August 1, 2010. NOAA disagreed. Administrator Jane Lubchenco asserted that combining the two categories would not decrease any uncertainty and that "'[c]hemically dispersed' is part of the federal response and 'naturally dispersed' is not, and there is interest in being able to sum up the federal response efforts." Jane Lubchenco, e-mail to Bob Perciasepe and others, August 1, 2010.

‡ On the other three shows, Browner similarly stated that "what the scientists are telling us is that the vast majority of the oil has been cleaned, it's been captured, it's been skimmed, it's been burned, mother nature has done its part" (*Fox News*); "our scientists are telling us that the vast majority of the oil has been contained, it's been burned, it's been cleaned" (*CBS*); and "our scientists and external scientists believe that the vast majority of the oil has now been contained, it's been skimmed, mother nature has done its part, it's been evaporated" (*CNN*).

FIGURE 5.2: August 4 Oil Budget



show that most of the oil was gone. The three-quarters of the oil not in the "remaining" category included "dissolved" and "dispersed" oil that was potentially biodegrading, but not necessarily gone. By 9:00 a.m., NOAA Administrator Jane Lubchenco e-mailed Browner's deputy and other officials to express her concern "that the oil budget is being portrayed as saying that 75% of the oil is gone": "It's not accurate to say that 75% of the oil is gone. 50% of it is gone—either evaporated or burned, skimmed or recovered from the wellhead." Lubchenco asked the officials to "help make sure" the error was corrected.[306*] She had made the same point to the White House before the Budget rollout; a July 30 e-mail to Browner's deputy had emphasized that Lubchenco opposed grouping dispersed oil with recovered oil because the former was "still out there or [was] being degraded."[307]

At a press briefing that afternoon, Browner said that the report had "been subjected to a scientific protocol, which means you peer review, peer review, and peer review." Earlier in the same briefing, Lubchenco had said "[t]he report was produced by scientific experts from a number of different agencies, federal agencies, with peer review of the calculations that went into this by both other federal and non-federal scientists."[308] The Budget, however, was not "peer-reviewed" as the scientific community uses that term. Many of the outside scientists listed as reviewers had not even seen the final report.

The rollout of the Oil Budget drew immediate criticism, with scientists pointing out that Browner's optimism about the percentage of the oil that was gone was unsupported, especially because of the uncertain rate of biodegradation.[309] Moreover, after a summer of ever-increasing official estimates of the spill's size, the public was dubious of the government's conclusions. As a *Times-Picayune* editorial noted, "From the start of the

* The U.S. Geological Survey, which had also been involved in developing the Oil Budget tool and editing the report, expressed similar misgivings about the portrayal of the report. At 11:00 a.m., U.S. Geological Survey scientist Mark Sogge told a colleague, "We need to keep in mind, and make it clear to others, that this is NOT a [U.S. Geological Survey] product." Mark Sogge, e-mail to Stephen Hammond, August 4, 2010.

disaster. . . the government has badly underestimated the amount of oil spewing from the runaway well. That poor track record makes people understandably skeptical of [the Oil Budget] report."[310] Lubchenco has since acknowledged that she was "in error" when claiming that the Oil Budget had been peer-reviewed.[311] NOAA has emphasized that the report's "purpose was to describe the short-term fate of the oil and to guide immediate efforts to respond to the emergency" rather than to "provide information about the impact of the oil" or "indicate where the oil is now."[312]

NOAA supplied these explanations on November 23, when it released a new version of the Oil Budget: *Oil Budget Calculator Technical Documentation*, a peer-reviewed report of over 200 pages that gave the formulas used and updated the percentages in the original budget.[313] The new version's biggest change was its estimate of the amount of oil chemically dispersed, which doubled from 8 percent to 16 percent. Of this additional 8 percent, 3 percent came from the "naturally dispersed" category, 2 percent from the "evaporated or dissolved" category, and 3 percent from the "residual" category. (These changes brought the total amount of "residual" oil down from 26 to 23 percent.)

As a tool for responders, the Oil Budget indicated that response and containment operations collected, eliminated, or dispersed about 41 percent of the oil, with containment ("direct recovery from wellhead") the most effective method, and chemical dispersants breaking down a substantial fraction. Response technology (skimming or burning) removed—as opposed to dispersed—only 8 percent of the oil. Dispersion of the oil before it reached the surface limited the amount that responders could skim, burn, or disperse at the surface. Nevertheless, responders considered burning an important success: it had never before been attempted on this scale, and burning techniques advanced during the spill.[314] Skimming was less of a success: despite the participation of hundreds of ships and thousands of people, it collected only 3 percent of the oil.

The least effective response technology was the berms, which the Oil Budget documents do not even mention. By the time BP capped the well on July 15—day 44 of the berm construction project—Louisiana's contractor estimated that 10 percent of one reach—6 percent of the total project—had been completed.[315] In late May, Governor Jindal had asserted that "[w]e could have built 10 miles of sand [berms] already if [the Corps] would have approved our permit when we originally requested it."[316] In fact, it took five months to build roughly 10 miles of berms, at a cost of about $220 million.[317] Estimates of how much oil the berms collected vary, but none is much more than 1,000 total barrels.[318] On November 1, Governor Jindal announced plans to convert the berms into part of a long-term coastal restoration project, which BP would continue to fund. In his recently released book, the Governor maintained that the berms were "one of the most effective protection measures" against oil reaching the Louisiana coast.[319]

The End of the Well, but Not the End of the Response

In mid-September, the first relief well—which BP had begun drilling in early May—finally intercepted the Macondo well, allowing BP to pump in cement and permanently seal the reservoir. On September 19, 152 days after the blowout, Admiral Allen announced: "the Macondo 252 well is effectively dead."[320]

But fears about health and safety did not die with the well. Some Gulf residents continued to believe that BP had used dispersants onshore, nearshore, at night, and without government approval, and that it had continued using them after it capped the well. The Commission has not seen credible evidence supporting these claims. NOAA reopened one-third of the area closed to fishing on July 22 and continued to reopen additional sections based on a testing and sampling protocol developed and implemented with the Food and Drug Administration.[321] But some scientists questioned the protocol, while some fishermen were hesitant to give up income from the Vessels of Opportunity program and return to their regular jobs in the midst of public concern about Gulf seafood.[322] (Chapter 6 discusses seafood safety.)

Residents also had to cope with the miles of used boom and other debris. Despite the typical spill-responder uniform of rubber gloves and protective coveralls, BP planned to send the thousands of tons of oily debris generated over the summer to ordinary municipal landfills.[323] Wastes from oil exploration and production are classified as non-hazardous by law and do not require specialized disposal.[324] Although the federal government generally does not supervise the disposal of non-hazardous waste, on June 29, the Coast Guard and EPA issued a directive requiring BP to test its waste for hazardous elements, publicize the results, and consult with the communities where the waste was to be stored.[325] In addition, EPA announced it would conduct its own twice-monthly testing of the debris and would post the results online.[326] BP was initially slow to release its testing data. After receiving a sternly-worded letter from Federal On-Scene Coordinator Admiral Zukunft on July 24, however, it started regularly posting the results on its website.[327] EPA began sampling the waste and posting the test data as well, after some criticism and delay.[328] As of November 17, EPA's tests had not shown any of the waste to be hazardous.[329]

As BP and EPA implemented the waste directives, environmental justice activists argued that BP was dumping the debris disproportionately in poor and non-white communities.[330] Residents of Harrison County, Mississippi fiercely opposed the disposal of oiled waste in their Pecan Grove landfill, and BP agreed not to use it.[331] Environmental justice advocate and scholar Robert Bullard contended that the racial makeup of Harrison County was a factor, and EPA objected to BP's decision.[332] The Federal On-Scene Coordinator instructed BP to follow the approved waste plan, noting that "[a]llowing one community to reject acceptance of waste. . . may complicate remaining waste disposal efforts." BP began to use the site for waste staging, though not for disposal.[333]

With the well sealed, the number of responders in the Gulf decreased. The National Incident Command officially stood down on October 1.[334] Admiral Allen turned over the remaining tasks to Federal On-Scene Coordinator Admiral Zukunft and finally retired. BP started to shut down some of its programs, and Coast Guard responders started to head to their next posts. The spill and the emergency response had ended. Figuring out the extent of the damage, and how to repair it, had begun.

Voices from the Gulf

"I don't know what to do with myself."

Susan Poag/The Times-Picayune. Photo © 2010 The Times-Picayune Publishing Co., all rights reserved. Used with permission of The Times-Picayune.

Dean Blanchard, Dean Blanchard Seafood Inc., Grand Isle, LA

Dean Blanchard runs Louisiana's biggest shrimp business, on Grand Isle—a Mississippi River Delta barrier island 50 miles south of New Orleans, fully exposed to the Gulf of Mexico. During the warm months of a typical shrimp season, Blanchard Seafood and its extensive network of bayside wharves are a frenetic cacophony of languages and accents—Spanish, Vietnamese, a smattering of Cajun French, and the various Deep South dialects—as more than a thousand fishermen offload the catch from their shrimping vessels. The shrimp are sorted by size and dispatched into the world.

During 30 years in business, Blanchard had become one of the nation's principal suppliers—and a multi-millionaire. In season, he bought as much as 500,000 pounds of shrimp daily from more than a thousand fishermen. The cold 2009-2010 winter had raised high hopes: "Every 10 years, when you get a cold winter, you get a really good shrimp crop," he explained. "We were licking our chops."

But with the Macondo well gushing more than 50,000 barrels of oil a day, and no end in sight, the brown shrimp season had been canceled just as it was about to start. By mid-May, tar balls and oil had started washing up onto Grand Isle's wetlands and beaches. By mid-June, Blanchard figured, "I've lost $15 million of sales in the last 50 days. That would have been $1 million in my pocket." The usually busy docks were quiet, the only activity the occasional coming and going of boats and crews working for BP cleaning and containing the oil."I don't know what to do with myself," Blanchard explained. "I built all this over the last 30 years, and now for what?" "We've got 1,400 vessels that go and catch shrimp, come to our facility." Now, he continued, "basically we've lost all our customers because we can't supply them."

For decades, oil and seafood had mixed comfortably in Louisiana's coastal culture. Each year Morgan City hosted the annual Shrimp and Petroleum Festival, a rollicking celebration of the state's two high-profile economic mainstays. Oil has long provided the region's best-paying jobs, and the revenue to finance everything from state roads to free school books. The maritime world of seafood has deeper cultural roots, and provides a living and a way of life along the gulf coast, one of the nation's most productive fishing waters. Many families had members in both worlds. Indeed, Blanchard's own grandfather had made a fortune servicing the offshore oil industry.

But now those two worlds had collided—and everything seemed at risk.