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IN RE: OIL SPILL BY THE OIL RIG "DEEPWATER HORIZON" IN THE GULF OF MEXICO ON APRIL 20, 2010

PHASE II REPORT – SOURCE CONTROL

IN THE UNITED STATES DISTRICT COURT

FOR THE EASTERN DISTRICT OF LOUISIANA

MDL NO. 2179 SECTION: J

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EACH EVENT AND FACT SITUATION MUST BE EXAMINED SEPARATELY TO FORM OPINIONS AS TO THE SPECIFIC EVENTS AND RELATIONSHIPS SURROUNDING AN INCIDENT.

EXCEPT FOR WHERE INDUSTRY PRACTICES AND STANDARDS ARE SET FORTH, THE ANALYSIS AND OPINIONS WRITTEN HERE DO NOT NECESSARILY APPLY TO ANY OTHER OR DIFFERENT FACTS OR EVENT.

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I. OPINIONS

A. Halliburton entities had no input for Source Control decisions nor for the response of BP as regards Source Control. [redacted] I have seen no deposition testimony or other documents related to Phase II – Source Control that indicate any Source Control failures on the part of Halliburton entities.

B. The "worst case scenario" flow rate from a reservoir or geologic Source sets upper risk boundaries. Planning and preparation avoids or mitigates risk to achieve Source Control for any level of flow up to that risk boundary.

C. BP was not a prudent and good and workmanlike oil and gas operator as regards Source Control at Macondo. [redacted]

D. When looking at the discrete tasks required to cap the well, only a few days are required to accomplish capping with existing technology and with venting options. BP wasted time with inadequately-modeled or low-probability-of-success attempts at Source Control. The time and/or effort wasted by BP with attempted ROV intervention, Top Kill procedures, the Riser Insertion Tube Tool, top hats, the cofferdam, low capacity storage and capture plans, paralysis or unresponsiveness, and constantly changing plans, resulted in Source flow to the Gulf of Mexico for many additional days. As a range of Source flow days that could be saved; capping Macondo in a week would save 80 days of Source flow – and that week is the ideal minimum.

[redacted]

F. BP, as the Designated Operator for the well, is solely responsible for Source Control. The BP Oil Spill Response Plan ("OSRP") simply and factually contains no Source Control plan (other than drilling relief wells) once the blowout preventer ("BOP") system fails to stop the flow.

II. INTRODUCTION

The purpose and intent of this report is to set forth Phase II - Source Control opinions formed for litigation called IN RE: OIL SPILL BY THE OIL RIG "DEEPWATER HORIZON" IN THE GULF OF MEXICO ON APRIL 20, 2010.[1]

Opinions formed are based on my education, training, experience, and research. My resume is attached as Exhibit A. Exhibit B is intended to comply with FRCP

[1] This report covers what I understand has been defined as Phase II of this process, and in the sub-area of Source Control, and covers primarily the time from April 22, 2010 (defined beginning of Phase II - Source Control) to first July 15, 2010 (Macondo well "capped" and "shut in"); and then to September 19, 2010 (relief well finished). I have reviewed the Court's order as to Source Control – "issues pertaining to the conduct of various parties [and others] regarding stopping the release of hydrocarbons stemming from the Incident from April 22, 2010 through approximately September 19, 2010." *See* PTO No. 41 (Doc. Rec. 4033) (September 14, 2011). While Phase II issues are defined as beginning April 22, 2010, the failure to properly plan for Source Control or for process safety began long before the blowout – and at least by the time the application for a drilling permit was filed for Macondo in 2009. It is important to look at events before the blowout to determine what should have been done to mitigate Source flow as soon as possible after the blowout.

Rule 26. Exhibit C or Consideration Materials (whichever list is most extensive) is a Bibliography of materials received, used, referred to, or reviewed for this report. Other figures or exhibits, incorporated as part of this report just as if written in the report body, are referenced in the body of the report or in footnotes; and are attached as indicated.

I have reviewed safety and well-control regulations for various jurisdictions; and industry standards and practice.

The opinions given are not intended to be legal opinions. I have a law degree and am a member of the Texas State Bar, but I do not practice law. However, it is necessary for the practicing safety professional or engineer to review and analyze applicable regulations in the proper analysis of an incident. As opposed to offering legal opinions on the referenced regulations or standards, I intend to use and apply them as would a person who needs to interpret, understand, and use the materials for prudent, successful, and safe work in the oil and gas industry.

In this report I may refer to various entities with terms or names such as "BP", "Transocean", "Halliburton", "Halliburton entities", "Wild Well Control", "MWCC", or others. The well will usually be called "Macondo" and the drilling rig that was on the well when the blowout occurred will usually be called MODU *Deepwater Horizon* or "drilling vessel". The Mineral Management Service ("MMS") was the regulator at the time of the incident - with successor entities BOEMRE, BOEM, and/or BSEE performing the same collective function as the former MMS.

III. MY BACKGROUND AND EXPERIENCE

I am a third-generation oil and gas operator and drilling rig owner; and a second-generation petroleum engineer. I grew up ten miles from the Drake Well,[2] the first United States oil well. The first "offshore" well was drilled about year 1861 from a dock on the Allegheny River near my boyhood home. It is important to have a historical perspective in this great industry. I learned about; and worried

[2] STEVE LEVINE, THE OIL AND THE GLORY 6 (Random House 2007).

about; well planning, well control, and safety beginning during my teenage years at what my father described as "Saturday recreation" – work in the oilfields in Pennsylvania.

I earned a Bachelor of Science degree in Petroleum and Natural Gas Engineering from The Pennsylvania State University (1972), and a law degree from South Texas College of Law (1979). My resume is attached as Exhibit A.

I first stood on a drilling rig floor in the Gulf of Mexico and supervised the landing of and other work for use of and problem-solving for sub-sea BOP systems in 1973 on the MODU[3] *Glomar II* (a drillship), and in 1974 on the MODU *Diamond M Century* (a semi-submersible). Since 1973, I have worked on projects in the offshore drilling industry for Source Control, operations, and safety – both in the Gulf of Mexico and internationally.

I am a registered Professional Engineer (Texas - Petroleum), have been certified as a United States Geological Survey ("USGS")[4] or Mineral Management Service ("MMS")[5] Offshore Installation Manager ("OIM"); and have other MMS/USCG operations and safety training. I have been trained as an OSHA 500-series Instructor (Construction and General Industry). I have also completed several hundred hours of related industry seminars and courses – well control, process safety, hazard analysis, planning and decision protocols, and safety engineering courses related to hazards, risk, and human factors.

I hold a Certified Safety Professional ("C.S.P.") credential; sponsored by the Board of Certified Safety Professionals. My C.S.P. designation is in the specialty of "Management Aspects" of the safety field.

I have been a member of various industry safety committees, including serving on the American National Standards Institute ("ANSI") Z49.1 Welding and Cutting safety committee, serving on an International Association of Drilling

[3] MODU is a term for Mobile Offshore Drilling Unit – American Bureau of Shipping ("ABS") rating and other formats.
[4] USGS is a predecessor regulator to the current BOEMRE/BSEE structure.
[5] MMS is a predecessor regulator to the current BOEMRE/BSEE structure.

Contractors ("IADC") safety sub-committee, and I was a charter member of the Society of Petroleum Engineers ("SPE") Gulf Coast Chapter Safety Committee.

I have been trained in well control on several occasions, in various formats, and at several well control and planning schools. I have planned, authored, reviewed, and used oil spill, emergency, and other response and contingency plans, for offshore, onshore, and international locations; and have trained workers for source and well control. These locations include in the Gulf of Mexico, Alaska, Guyana, Peru, offshore Ireland, the Nile Delta in Egypt, offshore Indonesia, and in the North Sea (British Sector) and at other locations. The contingency plans included equipment that was designed or selected, dressed[6] and staged[7] for well control, containment, and cleanup.

I have worked on dynamically-positioned rigs and moored/anchored rigs (drillships and semi-submersibles), and on jackup rigs, platform rigs, tender rigs, posted barges, inland barges, and submersible rigs. One of my employers owned/operated a semi-submersible drilling rig in the North Sea during the 1970s in the role of rig provider/drilling contractor and I was involved in that operation and performed safety, oil spill response, and safety responsibilities and wrote safety materials and programs for the operation.

I have owned drilling rigs and well control equipment in the past, and currently own and/or operate three land-based drilling rigs.

I have experience and training with several regulatory agencies with safety laws, regulations, or standards that cover the type of operations and equipment involved here (the USGS/MMS or successor entities (BOEMRE, BOEM, and/or

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[6] "Dressed" indicates that emergency flow control equipment, such as a capping stack or a dedicated or pre-arranged spare BOP, was pre-planned and set up with the correct connections or adapters, and with control or operating capability compatible with what was available on the drilling rig (MODU *Deepwater Horizon*) or other usable marine/deepwater capable systems and support.

[7] "Staged" indicates that the emergency flow control equipment described above would have been placed, with pre-planned logistics and installation methods, where it was readily available to be moved to the drillsite offshore in several days. Feasible staging areas might have included Houston, Texas, The Port of Fourchon, Louisiana, or Mobile, Alabama.

BSEE), OCSLA, OSHA and USCG, for example) in several capacities, and have training in and a working knowledge of those standards and regulations.

IV. METHODOLOGY

This report covers the Macondo blowout for Phase II litigation in the Source Control sub-area. Any underground geologic reservoir or porous media that can flow is a "Source".[8] The hazard to people, to the environment, and to equipment at Macondo was a Source flow. Source Control is the mitigation of that hazard.[9]

This report examines issues related to Source Control, including why pre-planning and preparation is an essential part of process safety to accomplish Source Control. Additionally, I look at why it took BP some 87 days to prepare and cap the well[10] when (a) capping plans and equipment should have been pre-planned, and Macondo ideally capped in about a week,[11] and (b) even with no plan in place the well should and could have been capped long before it was.[12]

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[8] "Source" is a term to define fluids in a reservoir or geologic formation. *See, e.g.*, MICHAEL GOLAN AND CURTIS H. WITSON, WELL PERFORMANCE, Second Edition, 7 (Prentiss-Hall 1991), which incorporates fluid and energy as coming from the source. This will be called "Source" in this report; and methods for controlling the Source will be called "Source Control". See a similar term for geologic Source as "kick source" in describing where gas can come from to initiate a blowout. W.C. GOINS, JR. AND RILEY SHEFFIELD, BLOWOUT PREVENTION, Second Edition 17 (Gulf Publishing Company 1983).

[9] *See* Figures 1, 2, and 3, attached, for lists, Levels, and Methods of Source Control.

[10] Weather and operational issues make exact time estimates not precise; but with what could have occurred, and with industry success at these procedures, the ideal minimum could be about a week (*See* Figure 5, attached); and even to about 3 – 4 weeks with a capping stack assembled after the blowout with no pre-planned equipment. Overall, these procedures could save 60 to 80 days of Source flow.

[11] TREX 9345, at pages 65-66 - Transcript of Public Forum on Offshore Drilling Panelists and Elected Officials - Bureau of Ocean Energy Management Enforcement and Regulation, dated September 13, 2010 (Statement by Dave Barrow with Wild Well Control – a BP vendor/contractor and a corporate member assigned to the well capping team by BP); *see also* Wellings deposition (Volume 1), January 16, 2013, at pages 57-60; *see also* TREX 3918 - Email - From: Kerry Girlinghouse To: Bob Franklin and others - Subject: PM#13 - SS Well Capping Rev2, with attachment; *see also* TREX 9664 – Teleconference re: FRTG, dated September 30, 2010 (MWCS estimated 24 days for capping); *see also* attached Figure 5 for

My methodology follows oil and gas industry and process safety protocols, and other analysis methods used in industry in general.[13]

[redacted] In addition to BP's process safety protocol, and industry and in-house information BP had available to it related to Source Control, I will apply an American Petroleum Institute ("API") recommended practice or standard which summarizes the proper elements of an offshore safety management program as (a) describe the hazard; and (b) take steps to mitigate the hazard.[15]

I formed opinions based on a reasonable degree of engineering and safety industry certainty. It is my best judgment as a practicing professional engineer and certified safety professional that engineering and safety aspects of this report are accurate and reliable.

V. THE INCIDENT - MACONDO WELL BLOWOUT

A. On May 13, 2009, BP filed an application for a drilling permit ("APD")[16] to drill an oil and gas well at deepwater Mississippi Canyon Block 252 ("MC

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task times for capping events; *see also* MWCC practice cap deployment materials – MWCC website cited in Bibliography at attached Exhibit C.

[12] TREX 9139/Document 7076 - Stipulated Facts Concerning Source Control Events, dated August 9, 2010 (stipulated facts, items for capping and then closing of well on July 15, 2010).

[13] DARYL ATTWOOD, OCCUPATIONAL ACCIDENTS IN THE OIL AND GAS INDUSTRY (VDM 2008) (discussing various methodologies, safety culture factors, philosophy, and policy); *see also* NICK CHEREMISINOFF, PRACTICAL GUIDE TO INDUSTRIAL SAFETY: METHODS FOR PROCESS SAFETY PROFESSIONALS (CRC Press 2000); *see also* Figures 9 & 10 (risk matrix methodologies and the Bow-tie Method of process safety); *see also* references listed in Bibliography at Exhibit C to this report to process safety methods.

[redacted].

[15] TREX 45059 - American Petroleum Institute ("API") RP 75, "Recommended Practice for Development of a Safety and Environmental Management Program for Offshore Operations and Facilities" (2008), at Sections 2 and 3, and specifically at Section 3.6.

[16] TREX 1896 - Form MMS 123A/123S - Electronic Version: Application for Permit to Drill a New Well (2009).

252") in the Gulf of Mexico in about 5,000 feet of water.[17] That well was MC 252 No. 1, also called the Macondo well.[18]

[redacted]

[redacted]

D. A loss of well control is always foreseeable in the oil and gas industry;[23] and was foreseeable by and was foreseen by BP at Macondo.[24] Macondo was

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[17] TREX 768 - Initial Exploration Plan - Mississippi Canyon Block 252 - OCS-G – 32306 (February 2009), at page 2-1.

[18] *Id.*

[redacted]

[23] TREX 7353 - IADC Deepwater Well Control Guidelines (October 1998).

[24] Wellings deposition, January 16, 2013, at page 17 (if the well blew out, no plan for response); *see also* TREX 4423 - Email, dated November 14, 2001 - From: Michael Byrd To: Curtis Jackson and others - Subject: PREP Exercise; *see also* TREX 1896.

drilled in deepwater and the necessity of having plans and means to control the deepwater well even more critical to BP.[25] In year 2001, BP developed a scenario almost identical to Macondo – the answer was "No" when the question was posed can BP shut in a BOP system with a well flowing 100,000 or 200,000 or 300,000 barrels of oil per day and when the rig, the MODU *Deepwater Horizon* in the exercise, has moved off location.[26] BP knew that (a) wells in deepwater could suffer loss of control, and that (b) ROV intervention, BP's only intervention means other than drilling relief wells,[27] would not be effective Source Control.[28] Even at lower Source flow rates than the 100,000 barrels a day in the BP document cited above, the ROVs available commercially did not have the capability to close the BOPs effectively;[29] or ROVs should not be used at all on a flowing well.[30]

E. BP knew that deepwater-capable dressed and staged Source Control[31] equipment or plans (*i.e.*, if the blowout preventer ("BOP") system is ineffective) was not in place for the BP Macondo well.[32] Nevertheless, BP drilled the well it

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[25] Wellings deposition, January 16, 2013, at page 17; *see* TREX 2216 – Email, dated June 26, 2010 - From: Seth Feyereisen To: DD2 Well Site Leader and others - Subject: FW: Well Control Response Guide, with attachment (BP Gulf of Mexico "Deepwater SPU Well Control Response Guide" dated January 2010).
[26] TREX 4423 (scoping and planning document for Source Control and intervention).
[27] Lynch deposition, May 19, 2011, at page 296-297 (no other proven options to close BOP).
[28] *See* IMT030-028759 (Exxon Mobil response to industry input request from Secretary Salazar; Exxon Mobil suggested need to improve ROV capability, on April 30, 2010).
[29] TREX 1166 – Email, dated August 6, 2010 - From: William Stringfellow To: John Keeton - Subject: secondary intervention, with attachment (discussing ROV intervention at Section 3); *see also* TREX 3624 – West Engineering Services, Inc. Evaluation of Secondary Intervention Methods in Well Control for U.S. Minerals Management Services (March 18, 2003) (MMS/BSEE Final Report 431).
[30] TREX 3624, at page 82.
[31] *See* Figure 2, attached to this report. In Figure 2, the Fifth Method of Source Control begins after no success is achieved with the rig BOP equipment.
[32] *Id.*; *see also* IMT030-028754 (other operators that also said the procedure should be to cap the well; ConocoPhillips suggested to clear well and cap well); *see also* IMT030-028761 (Apache Corporation suggested to clear well and cap well).

characterized as challenging and difficult[33] with no backup or replacement BOP system planned, determined, dressed, or staged for Source Control.[34]

F. The subject Macondo well was not controlled or capped for approximately 87 days after the loss of control (April 20, 2010 to July 15, 2010). The well was cemented and then "intersected" by a relief well, and not overcome until about 150 days after the loss of control.[35]

G. Capping the well should have occurred much sooner than it was accomplished. With proper planning and decisions, the well ideally could be capped in as little as one week.[36] One source of the one week capping estimate is from Wild Well Control[37] that BP says it relies on for Source Control services. This time estimate by Wild Well Control is independently collaborated by the discrete (and very short) actual time intervals required to prepare the well and cap the well. *See* Figure 5, attached, for a summary of the short time required for actual capping tasks.[38] In addition to being the actual and short capping task times experienced as set forth in Figure 5, the times indicated are feasible, industry-predictable, and reasonable times to accomplish those tasks.

H. Even if the capping device was not pre-planned, dressed, and staged before April 20, 2010, the well could have been capped, using available components, technology, and procedures, by about mid-May, 2010 – therefore saving approximately 60 days of Source flow time.[39]

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[33] TREX 3808 (Chapter 3.1 related to well design).
[34] Hayward deposition, June 6-7, 2011, at page 343 (stating "we certainly didn't have all of the tools"); Rohloff deposition, October 17, 2012, at page 48 (acknowledging no identified equipment).
[35] TREX 9139/Document 7076 – Stipulated Facts (for example items No. 127, 137, 163 and 164).
[36] *See* Wellings deposition (Volume 1), January 16, 2013, at pages 57-60, 78-79; *see also* TREX 9345, at pages 65-66; *see also* TREX 3918; *see also* TREX 9964 (MWCS estimated 24 days for capping).
[37] TREX 9345.
[38] TREX 9139/Document 7076 – Stipulated Facts (items 51, 83, 90, 123, and 127).
[39] Turlak deposition, November 7, 2012, at pages 402-404 (BOP-on-BOP was "ready to go May 13th and 14th").

I. The actual capping effort for Macondo (and its belated success), although not properly pre-planned with dressed and staged equipment in place, was much quicker than BP's only Source Control plan other than the BOP system – *i.e.*, drilling relief well(s).[40]

J. [redacted]

K. Time matters when the Source is flowing out of control. At the projected "worst case scenario" flow rate of 162,000 barrels per day[42] or even at the actual rate at Macondo – every single day is critical for Source Control.[43] This is why pre-planning, preparation, and good decisions for Source Control are so critical.

VI. BASIS FOR OPINIONS

A. HAZARD AND RISK ANALYSIS NECESSARY FOR SOURCE CONTROL

- BP MUST CONSIDER SOURCE HAZARDS AND RISK

- BP MUST ESTIMATE POTENTIAL SOURCE FLOW VOLUME AS SOURCE VOLUME RELATES TO RISK MAGNITUDE AND HOW TO CONTROL THE SOURCE

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[40] TREX 9139/Document 7076 – Stipulated Facts (see date of actual capping vs. when relief well "intersection" occurred).

[redacted]

[42] TREX 769; TREX 768.

[43] 30 C.F.R. 250.107 (b) ([designated operator on OCS] "must immediately control" spill).

1. Source Control is necessary to avoid potentially: (a) injuring or killing humans and wildlife; (b) flowing oil in the Gulf of Mexico and to coastal areas; and/or (c) damage to or loss of equipment.[44] A prudent oil and gas Designated Operator[45] or Responsible Party[46] must undertake hazard analysis and determine risk for its operations.[47]

2. Pre-planning and analysis is necessary to avoid, mitigate, or minimize Source Control events. BP did not prioritize the risk of this hazard, nor plan or prepare commensurate with the level of risk before drilling the well.[48]

[redacted]

[redacted]

[redacted]

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[44] TREX 51497 - 30 CFR 250 Oil & Gas and Sulphur Operations in the Outer Continental Shelf.
[45] The leaseholder is the owner or is one of several owners of the MMS/USGS lease rights, and the "designated operator" and "responsible party" is usually a lease holder.
[46] The "responsible party" is usually a leaseholder, is responsible for following regulations, and is the party in charge of the offshore operation.
[47] TREX 45059.
[48] TREX 60792; TREX 60828.
[redacted]

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[redacted]

f. The National Safety Council advocated the use of processes such as "what if" analysis, process safety techniques, or other predictive methods determine the means needed to avoid or minimize risk in its book Safety Through Design.[71].

[redacted]

[71] NATIONAL SAFETY COUNCIL, SAFETY THROUGH DESIGN (NSC Press 1999).

[redacted]

8. [redacted] This means that the "performance standard" says what must be achieved; but not how BP must do each task. BP was required to be able to control and to maintain well control at all times, to perform all operations in a good and workmanlike manner, to stop spills immediately, [redacted]

9. The BOP system is a method of Source Control, and an ineffective BOP system was foreseeable to BP.[76] In the offshore environment, there are numerous blowout and well control events documented in the SINTEF database (since year 1955) that were related to BOPs that were ineffective; so other Source Control beyond the BOP system could then be both foreseeable and necessary.[77]

[redacted]

[76] Wellings deposition, January 16-17, 2013, at pages 16-17 (no planning if BOP ineffective); TREX 4423.

[77] SINTEF Industrial Management/Scientific, Report No. STF 38 (2001).

10. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

11. There was no plan in the BP Oil Spill Response Plan ("OSRP"),[81] or elsewhere at BP, with engineered, designed, and dressed and staged equipment for Source Control up to the Macondo "worst case scenario", or even for a fraction of that flow rate as actually occurred at Macondo. If the BOP system was not effective, BP then had to move to the next higher Source Control Level. But as BP Group, plc CEO Tony Hayward testified, BP had no plan nor preparation to move to the next Source Control Level.[82] *See also* Figures 1 and 2, attached.

12. [redacted]

13. If proper risk assessment and planning is not implemented as part of the safety culture or philosophy at BP, the results include that an unwanted event (*i.e.*, an uncontrolled Source) leads to a "paralysis" or "unresponsiveness" on the part of decision makers and technical persons as there is no plan, there is no existing equipment dressed and staged for the event, no alternate analysis and

[81] TREX 769.
[82] Hayward deposition, June 6-7, 2011, at page 343 (no tools and no plan); *see also* Rohloff deposition, October 17, 2012, at page 48 (no plan if BOP ineffective); *see also* Lynch deposition May 19, 2011, at page 117 (where Mr. Lynch, BP VP of Drilling and Completions at the time of the Macondo blowout, said BP could stop the flow or collect the flow "if the BOP had worked"); *see also* Campbell deposition, July 12, 2011, at page 68 (information on replacement BOP ("cap") availability if pre-planning had been performed by BP: "we [Wild Well Control] own hundreds of blowout preventers").
[redacted]

ranking of solutions has been performed, re-analyzed, and practiced or rehearsed, and many people or entities become involved in the serious unwanted event as teams and committees are formed to see what can be done "now" – as the event was not pre-scoped and pre-planned.

B. PRE-PLANNING AVOIDS "ANALYSIS PARALYSIS" OR "UNRESPONSIVENESS" ONCE THE SOURCE CONTROL EVENT EXISTS

1. Once an unwanted event occurs (*i.e.*, a blowout), Source Control requires pre-determined and decisive action by BP. The failure to have planning in place and designed, dressed, and staged equipment for Source Control beyond the rig BOP system resulted in the necessity to move to the next level of methods of Source Control with no plan for how to do so.[85] *See* Figures 1, 2, and 3, attached.

2. BP made the economic decision to drill the Macondo well; and BP was successful in finding a huge oil reservoir – *i.e.*, BP succeeded geologically. However, in case of a Source Control problem, BP did not develop a plan nor tools to accomplish intervention for Source Control before relief wells could be drilled.[86] The needed tools (BOP components to build a capping stack and related technology) were available before Macondo.[87] [redacted]

[85] TREX 9139/Document 7076 – Stipulated Facts (items No. 34, 46, 49, and 52).
[86] Wellings deposition, January 16, 2013, at page 54 ("We [BP] never looked at it [capping stack] prior to the event.").
[87] TREX 3918 (Wild Well Control capping stack installation procedure).
[redacted]

[redacted]

3. The failure of BP to have planned, rehearsed, and established procedures and to have available, dressed, and staged equipment resulted in BP responding in a manner that significantly impeded Source Control. [91]

4. The response of BP exhibited a "paralysis" and "unresponsiveness"[92] when it had determined years earlier that there were two viable options (capping and relief wells) for controlling a high flow rate Source. [93]

5. The involvement of numerous people or entities at stressful and critical times leads to what I term "analysis paralysis". "Analysis paralysis", or similar language, is an industry term and in documents for this case is both used by BP and used by a BP vendor as a term describing a process that is slowed, that takes wrong turns, and that ultimately results in a prolonged and larger unwanted event: here more days of Source flow than should occur.[94]

6. BP exhibited "paralysis" and "unresponsiveness" as it had no plan in place. Instead of proceeding to prepare and cap/vent the well immediately, BP failed to follow its in-house historical response determinations such as for BP Alaska

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[redacted]

[91] TREX 9139/Document 7076 – Stipulated Facts (from April 22, 2010 to July 15, 2010 that several options were attempted for Source Control that were different than the capping and relief well options determined by BP in about year 2001 to be the feasible options with a good chance of success).

[92] Bibb Latane & John M. Darley; *Bystander Apathy*, AMERICAN SCIENTIST Volume 57, No. 2 (Summer 1969).

[93] Turlak deposition, November 7, 2012, at pages 263-274, 548-549 (illustrates many changes of plans).

[94] *Id.*; *see also* McWhorter deposition, November 15, 2012, at pages 277-278, 280 (discussing issues similar to those in TREX 10072); *see also* TREX 10072 – Email, dated May 30, 2010 - From: Don King To: Melvin Whitby and others - Subject: Re: Update 29May10 (observations of BP changes, "scrabble", chickens with heads cut off, paralysis); *see also* BP-HZN-2179MDL01334280 - GOM SPU for Risk Management, at Section 3.2 (2009) (BP used terms such as "paralysis").

planning[95] that determined years earlier that the Source Control practical and effective options are (a) capping the well with pre-determined equipment, and (b) concurrently drilling relief well(s).[96] The use of capping stacks has long been established in the industry as a successful and viable method of Source Control[97] – but BP failed to immediately proceed to prepare to cap and to cap the well even though it had determined years before that capping was the viable and proper method while concurrently initiating drilling relief well(s).[98]

7. Richard D. Lynch, Jr., the BP Vice-President of the Global Wells Organization, who presided over the Macondo planning, testified "safety is a critical element" and "in BP, everyone of us have an accountability for safety."[99] The truth is that at BP if everyone was accountable for safety; everyone failed. Through "paralysis" or other failure both before and after the blowout, BP did no Source Control planning for Macondo.

8. The same BP VP Lynch described above testified, "I do not know" when asked [redacted] to identify one single BP oil spill response plan anywhere in the world (even after Macondo) that dealt with being able to control a "worst case scenario" flow or the actual flow rate from a well.[102]

9. Other examples of BP "paralysis" and "unresponsiveness" include (a) changing rigs and ships (*i.e.*, which rig to get BOPs from and changing plans and

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95 TREX 9828 - Best Available Technology [18 AAC 75.425(e)(4)] – Draft (July 2001) (BP Alaska planning documents).

96 *Id.*; TREX 2386 - BP GoM Deepwater SPU - Well Control Response Guide (January 2010) (a few months before Macondo).

97 McWhorter deposition, November 15, 2012, at page 178 (knows of capping stack use before Macondo).

98 *Id.*; *see also* TREX 3918; *see also* TREX 7353.

99 Lynch deposition, May 19, 2011, at pages 41-42, and at page 49.

[redacted]

102 Lynch deposition, May 19, 2011, at pages 118-120 (BP had no OSRP for worst case scenario).

ships to capture oil);[103] b) two-ram versus three-ram capping stack;[104] (c) designing and making ROV tools in a last-minute manner rather than pre-planned;[105] (d) design, size, and weight not pre-planned for containment dome; (e) cofferdam or caisson failures due to installation and planning problems;[106] (f) surface capacity (vessel) shortcomings for oil collection;[107] (g) not having pressure and temperature data collection needed for calculating Source flow rate and other critical information;[108] (h) failure within BP to accurately and transparently transmit information inside BP and to others; (i) time to make the overshot tool to help remove the flex joint;[109] and (j) having "dumb iron" (*i.e.*, BOP system components) available[110] but no planned hydraulics and controls and adapters and no procedures for use of the capping stack (venting, shut in criteria, *etc.*). Also included on this list are the items that BP should have done in another section in this report as ultimately wasting time and impeding the Source Control efforts.[111]

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[103] Wellings deposition, January 16-17, 2013, at pages 136-137, 303-305; TREX 11228 - PowerPoint: Overview - Well Capping Macondo No. 1 (May 13, 2010) (discusses options)

[104] Wellings deposition, January 16-17, 2013, at pages 102-103, 131-138, 139-140, 331, 341, 441, 465-468; TREX 11228.

[105] Wellings deposition, January 16-17, 2013, at page 234.

[106] TREX 11249 – Email, dated May 11, 2010 - From: James Wellings To: Mark Patteson and others - Subject: RE: USCG (discussing hydrate formation).

[107] TREX 2291 - Stopping the Spill: the Five-Month Effort to Kill the Macondo Well, Staff Working Paper No. 6 (January 11, 2011) (at vessel or collection sections); TREX 9119, - Letter: To: Doug Suttles From: James Watson, USCG regarding oil collection through the Q4000 (June 19, 2010); TREX 10566 - Letter: To: Doug Suttles From: Rear Admiral James Watson - Subject: BP submitting a plan for building additional capacity and redundancy for collection efforts (June 11, 2010).

[108] TREX 10075 – Email, dated June 1, 2010 - From: David Simpson To: Todd Mosley and others - Subject: RE: ENI Block 15-06, with attachment; *see also* TREX 11250 – Email, dated June 24, 2010 - From: David Brookes To: Matt Gochnour and others - Subject: FW: DOE Team - Quick Response Assessment Complete!, with attachment (instrumentation for capping stack such as pressure gauges and data capability).

[109] Wellings deposition, January 16-17, 2013, at page 234.

[110] Wellings deposition, January 16-17, 2013, at page 485; *see also* TREX 7104 – Email, dated May 31, 2010 - From: Charles Curtis To: John Schwebel and others - Subject: RE: Thanks For the Good Work BOP on BOP and Capping Stack Team, with attachment

[111] See Report, Section VI.B.9 for similar citations for these issues.

10. [redacted]

11. In summary, such wrong turns by [redacted] resulted in a situation of "paralysis" and "unresponsiveness" and the 60 to 80 days of additional Source flow discussed elsewhere in this report, as time lost instead of aggressively moving forward to prepare the well (*i.e.*, to remove the riser and prepare the selected cap mounting point (*See* Figure 4, attached)) and cap/vent it. Even if BP did not have a pre-planned cap, using another cap (BOP-on-BOP[113] or assembling a cap), BP had done HAZIDs and planning for capping, and should have been able to cap/vent the well by about mid-May 2010[114] instead of July 15, 2010 – saving approximately 60 days of Source Control time.[115]

[redacted]

[113] TREX 3918.

[114] Turlak deposition, November 7, 2012, at pages 402-404; TREX 10505 – Email, dated May 17, 2010 - From: Paul Tooms To: Harry Thierens - Subject: FW: Top Preventer Peer Assist Recommendations, with attachments; TREX 10516 – Email, dated May 9, 2010 - From: Bernard Looney To: Doug Suttles and others - Subject: Updated "Our Plan," with attachments;

12. Because BP did not have a proper plan in place and evidenced "paralysis", "paralysis analysis", "paralysis by analysis", and/or "unresponsiveness", the BP response, and failed and wasted efforts, impeded and extended Source flow. Each day of preventable Source flow is critical.

C. SOURCE CONTROL PROCEDURES – WHAT BP DID

1. Once the Macondo well started to flow and flow at high flow rates, the Source Control failures by BP set forth elsewhere in this report related to the BOP system was implemented (*i.e.*, trying to shut the well in – largely, after the initial rig-floor shut in attempts, by attempts with non-capable ROVs). The BOP system, while "operating" and "functioning" in some respects, was not effective and was defeated by the high flow rate (erosion of seals and rams, *etc.*) or results of the high flow rate.[116]

[redacted]

TREX 10528 - Email - From: James Wellings To: Harry Thierens and others - Subject: FW: LMRP Vessel Recovery Options, with attachments; TREX 10675 - Email - From: Richard Brannon To: Michael White and others - Subject: Houston 16May2010 - 2000 EST Update (going ahead with Top Kill effectively took the quickest capping option (BOP-on-BOP) off the table and delayed and impeded Source Control).

[115] TREX 9139/Document 7076 – Stipulated Facts (various dates in May for a time indication of progress on this work; and items for capping in July 2010).

[116] TREX 3808 (see Blowout Preventer Section 3.4); TREX 4304.

[redacted]

3. BP had determined a decade before Macondo when BP examined Source Control options in its remote Alaska operations, that the viable Source Control options were (a) having pre-planned and staged capping equipment with the correct connections and capping the well; or (b) drilling relief well(s).[121]

4. In spite of the BP Alaska hazard and risk analysis in 2001 and mitigation technique determination[122] that the [redacted] viable procedure was (a) to cap an out-of-control well with pre-planned equipment while (b) drilling relief well(s),[123] BP errantly proceeded to attempt time-wasting and low-probability of success or non-risk-assessed procedures. The summary of what BP attempted or had failed to do that affected and impeded the overall Source Control schedule and progress includes:

[redacted]

[redacted]

[redacted]

[121] TREX 9828 (BP Alaska analysis of Best Available Technology-based ("BAT") determination for (a) capping with pre-planned equipment and (b) drill relief wells); *see also* TREX 9171 - Section 4.2.1, Well Source Control, draft; TREX 9346 - Document: Best Available Technology [18 AAC 75.425(e)(4)] – Draft; TREX 9827 - Best Available Technology (BAT) Analysis Well Blowout Source Control.

[122] TREX 45059 (see Section 3.6 for how to mitigate risk: identify the hazard; then analyze the risk).

[123] TREX 9171; TREX 9346; TREX 9827; TREX 9828.

[redacted]

[redacted]

[redacted]

d. BP failed to clear the riser from the top of the BOP system, release the LMRP (which BP's contractor (Cameron) said could be done),[130] and

[redacted]

[130] McWhorter deposition, November 15, 2012, at pages 141-143, 147-148 (LMRP designed to be removed).

prepare the well for capping. This preparation could have been accomplished in all probability well before May 1, 2010.[131]

e. BP failed to immediately source a capping/venting stack and install it.[132] Even though BP failed to pre-plan, dress, and stage equipment to accomplish Source Control, as it should have, the capping stack solution for Macondo was nonetheless set forth by or for BP as early as April 22-23, 2010 (Lynch, Wild Well Control, or others);[133] then put on paper by at least April 27, 2010 (Wild Well Control);[134] and the BP well capping team was established by April 26-27, 2010 (Wellings et al).[135]

f. BP attempted failed remotely-operated vehicle ("ROV") procedures on the MODU *Deepwater Horizon* BOP system.[136] BP both was operating with [redacted] BOP components compromised or not

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[131] TREX 3922 – Email, dated May 14, 2010 - From: Pat Campbell To: Mark Patteson - Subject: BP Macondo 252-1 Well ---PRIVATE & CONFIDENTIAL; TREX 9139/Document 7076 – Stipulated Facts (for time to accomplish capping tasks); TREX 10514 – Email, dated May 30, 2010 - From: Don King To: Stuart Nelson - Subject: Re: BP Horizon - BOP Pressure Relief Manifold; TREX 150042 – Email – From: Jim Hackett To: Nancy Seiler – Subject: Comments; *see* also Figure 4, attached, for discreet capping task times.

[132] TREX 9139/Document 7076 – Stipulated Facts (various items).

[133] Campbell deposition, July 12, 2011, at page 184; Lynch deposition, May 19, 2011, at pages 205-206; TREX 9139/Document 7076 – Stipulated Facts (see item 28 "capping stack . . . identified as potential source control options . . .").

[134] TREX 3918 (Wild Well Control capping document dated April 27, 2010 setting forth a BOP-on-BOP capping stack procedure).

[135] Wellings deposition, January 16, 2013, at page 24; TREX 9787 - Gulf of Mexico Strategic Performance Unit - HAZID Report MC-252 BOP on BOP Capping Option (May 7, 2010); TREX 10879 – Email, dated May 15, 2010 - From: Eddy Redd To: Serge Schultz and others - Subject: Fw: Priority for Completion of BOP Work on the DDII; TREX 11402 – Email, dated April 30, 2010 - From: James Wellings To: Mark Patteson and others - Subject: FW: Macando Well Cap Sequence - 1st Draft, with attachment.

[136] TREX 9139/Document 7076 – Stipulated Facts (see items No. 25 and 31).

[redacted]

working; incapable ROVs or no workable ROV options;[138] and eroded or damaged BOP rams from the high potential flow rates [redacted].[139]

g. While citing concerns about closing in the well [redacted] BP was attempting to achieve a hard closure[140] (as opposed to closing/venting) at least on or by April 22, 2010, and for about two weeks after that date, to close the BOP system or to accomplish Source Control with the BOP system (ROVs, *etc.*).[141] These shut-in attempts would have lead to a hard closure in spite of BP asserting concern about well integrity if the well, [redacted] and wellhead area was subject to shut in well pressures. [redacted]

[138] Campbell deposition, July 12, 2011, at pages 156-157; *see also* Stringfellow deposition, April 11, 2011, at pages 92, 153-154; *see also* TREX 1166 (well intervention discussion of ROV intervention capability at Section 3); *see also* TREX 3624; *see also* TREX 6094 - Stones WR 508 #1, Technical File Note, Issue: Test Ram Conversion (August 4, 2004); *see also* TREX 7023 – Email, dated May 3, 2010 - From: Carter Erwin To: Jason Van Lue - Subject: Re: Status?; *see also* TREX 10234 – Email, dated May 3, 2010 - From: Eddy Redd To: Steve Hand - Subject: Fw: Plumbing error on the Horizon stack (!?).

[139] TREX 7023; TREX 9139/Document 7076 - Stipulated Facts (see items No. 22 and 31); TREX 10234.

[140] A "hard closure" is shutting the well in completely as opposed to closing the well bore off but still having some flow (venting) through choke or kill lines off the side of the BOPs; with a "soft closure" the well, wellhead, and BOPs do not see the full well Source pressure as it is not completely shut in at the BOP.

[141] Lynch deposition, May 19, 2011, at page 117.

[redacted]

h. [redacted]

i. BP did not have planning for or even under contract high rate capture equipment, storage equipment, or transport equipment (vessels, riser, flowlines, vents) for collected oil (either from the well or from the Gulf) capable of anything remotely close to the "worst case scenario" rate nor for the lower actual flow rate.[149] BP, in spite of performing some analysis,

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[redacted]

[149] Campbell deposition, July 12, 2011, at pages 146-148 (not enough capacity).

because BP used the [redacted] number of 5,000 barrels a day, attempted various surface collection or storage options (for the captured Source flow).[150] Due to storage inadequacies (vessel capacity, offloading systems not planned for, *etc.*) and pre-contracting and mobilization deficiencies (*i.e.*, BP contracted for one vessel in late May and one in early June, *etc.*)[151] collection, capture, or storage failed to capture all of the oil; resulting in significant oil that still flowed to the Gulf of Mexico and some of that flow was left in the Gulf or adjacent areas. BP apparently failed to collect most of the Source flow over the time period from April 22, 2010 to July 15, 2010.[152]

j. BP inserted a Riser Insertion Tube Tool into the riser. BP acknowledges that it did not model the procedure or use available information.[153] The flow rate, compared to collection, capture, or storage equipment BP had in place, was too high to capture all or most of the oil and the procedure was only partially successful in capturing oil and wasted time.

k. BP attempted to install a Cofferdam or Caisson device to capture flow. BP acknowledges that it did not model the procedure or use available information.[154] The flow rate was too high to capture all of the flow; BP did not have enough combined surface storage or venting capacity; did not have a plan for enough combined surface storage capacity; with pre-planning a better collection device could be designed; did not have a viable procedure to lower or land the system over the well, and other well-related and fluid-related problems (*e.g.*, hydrates) caused the Cofferdam procedure to fail.[155]

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[150] Lynch deposition, May 19, 2011, at page 230 (*Enterprise* only 15,000 barrels per day capacity).
[151] TREX 9123 - Report: Deepwater Horizon Strategy Implementation, Version 5.0 (September 29, 2010).
[152] *See* BP daily and other reports cited in Bibliography at Exhibit C, attached, for reports and collection/capture data for flow to vessels.
[153] BP Exploration & Production Inc.'s Responses to Interrogatories From Rec. Doc. 8604.
[154] BP Exploration & Production Inc.'s Responses to Interrogatories From Rec. Doc. 8604.
[155] Lynch deposition, May 19, 2011, at pages 211-212.

l. BP attempted to install a Top Hat device to capture flow. BP acknowledges that it did not model the procedure or use available information.[156] The flow rate was too high relative to the weight and design of the device(s)[157] so the procedure failed and wasted time. In the alternative, BP did not have high rate capture or surface storage equipment (vessels, riser, flowlines) capable of anything remotely close to the "worst case scenario" rate, nor for the actual lower flow rate. With prior planning a better collection device could have been designed.

m. BP did some analysis and started some plans, but then changed plans and BOP system equipment scenarios from or among several different drilling rigs.[158] BP then abandoned the BOP-on-BOP capping procedures for capping the well that would use primarily equipment that was available on drilling rigs and/or could have been modified long before the capping stack installed in mid-July 2010 was ready to install.[159]

n. BP had not planned for a capping stack before drilling Macondo.[160] After the blowout at Macondo and beginning its response, BP initially planned a two-ram capping stack rather than a three-ram capping stack (primarily changed for vent capability) – which wasted time and effort and delayed the capping procedure. To give the most options, the initial plan, let alone what should have been pre-planned, should be for a capping stack with flow, vent and/or capture capability (such as a flow nipple/valve inserted into the top of the cap when attached to the well system).[161]

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[156] BP Exploration & Production Inc.'s Responses to Interrogatories From Rec. Doc. 8604.
[157] Campbell deposition, July 12, 2011, at page 146.
[158] TREX 9139/Document 7076 - Stipulated Facts (see items for BOP-on-BOP and rig from May and June 2010).
[159] Herbst deposition, October 11, 2012, at pages 495-498, 527; TREX 4405 – Email, dated May 11, 2010 - From: James Wellings To: Trent Fleece - Subject: RE: DD2 stack G/A dwg; TREX 9139/Document 7076 – Stipulated Facts (see items No. 62 and 83); TREX 10894 – Email, dated May 10, 2010 - From: Rob Turlak To: John MacKay and others - Subject: RE: DDII - USE FOR PULLING DWH LMRP & CAPPING WELL WITH DD II BOP.
[160] TREX 9349 (see Request No. 8 (two-ram) and at Request No. 9 (three-ram)).
[161] TREX 9139/Document 7076 - Stipulated Facts (see items for 2-ram vs. 3-ram capping stack timing and events).

o. Such equipment as ROV tools to remove flanges, adapter spools, an overshot tool to remove the flex joint once unbolted, and similar tools and adapters, were not pre-fabricated before the well was drilled; nor even fabricated as soon as possible after April 22, 2010. At either time these tools could have been made available for any connection, BOP-on-BOP, or capping/venting options and contingencies.[162]

p. The basic and necessary tasks to quickly cap the well were actually accomplished or could have been accomplished very quickly if viewed in precise sub-time segments. For example, the fallen riser was removed and the top of the MODU *Deepwater Horizon* LMRP connection was prepared for the capping system, and the well actually capped in about a week of actual work days when the discrete time segments are added up – *See* BP daily reports, WWCI reports, and various deposition testimony (Harland, Wellings, and others).[163] *See* Figure 5, attached.

5. BP ultimately, but much later than it should have, cleared the riser from the wellhead area,[164] installed a capping stack on July 12, 2010;[165] and shut the well in on July 15, 2010 – achieving one level of Source Control. The capped and static well was then cemented.[166]

6. The relief wells continued after the well was capped, with "intersection" or close approach to the Macondo wellbore about September 19, 2010.[167] The well was then "killed" from the relief well approach.[168]

7. The steps in the failed procedures outlined above in parts of this section took much time, cost a lot of money, wasted effort, and impeded the overall capping procedure implementation and Source Control accomplishment.

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[162] TREX 9139/Document 7076 - Stipulated Facts (see items for adapters and overshot tool).
[163] TREX 9139/Document 7076 - Stipulated Facts (see items 51, 83, 90, 123, and 127).
[164] TREX 9139/Document 7076 - Stipulated Facts (see item No. 90).
[165] TREX 9139/Document 7076 - Stipulated Facts (see items No. 127 and 137).
[166] TREX 9139/Document 7076 - Stipulated Facts (see items No. 151 and 153).
[167] TREX 9139/Document 7076 - Stipulated Facts (see items No. 163 and 164).
[168] TREX 9139/Document 7076 - Stipulated Facts (item No. 165).

8. [redacted]

9. [redacted]

D. SOURCE CONTROL PROCEDURES - WHAT BP SHOULD HAVE DONE

1. Capping devices had been designed or used in the industry for Source Control. Cameron had designed a sub-sea capping device in the 1980s.[169] Reportedly Shell and Senta Drilling, working in the deepwater offshore Brazil; had capping devices.[170] A plan to cap the well with equipment already pre-planned, dressed, and staged could ideally take about 7 days.[171] If the capping equipment is not pre-planned and available, BP still, had it not wasted time and consumed its efforts with such debilitating factors as (a) poor data gathering capability (to calculate flow rates), [redacted] (c) change from 2-ram to 3-ram capping options, and [redacted] should have reasonably capped the well much more quickly than the 87 day mark (July

[169] McWhorter deposition, November 15, 2012, at pages 175-176 (Bin Loman capping LMRP).
[170] McWhorter deposition, November 15, 2012, at page 178; *see* IMT030-028761 (Apache Corporation said Shell and Senta Drilling have caps in Brazil in response to industry input request from Secretary Salazar on April 30, 2010).
[171] *See* Figure 5, attached, for discreet capping task time intervals.

15, 2010).[172] Between the optimal 7 days discussed elsewhere in this report, and the actual 87 days, BP impeded and caused great delays in capping the well and achieving Source Control. Note: Citations for these times and factors are in the report in this section and elsewhere in the report as each item is discussed.

2. As a starting point, BP has to plan for Source Control by using hazard and risk analysis.[173] BP should have a properly implemented process safety plan for risking of hazards – having a protocol in a book is not enough; it must be used.[174] BP should have treated Macondo pre-planning and preparation commensurate with BP's ranking of a Gulf of Mexico blowout at BP Group, plc's highest risk ranking for a "Catastrophic loss of containment (process)".[175]

3. BP had determined by year 2001, a decade before Macondo, that the Source Control options most likely to succeed for high flow rate uncontrolled wells were (a) capping the well; or then (b) drilling relief well(s).[176] Simply, capping the well was the feasible and pre-determined option at BP – but capping the well was delayed and eventually accomplished; during which delay approximately 60 – 80 days of additional Source flow occurred.

4. BP should have had a proper, robust Source Control response and control plan for what to do to accomplish timely and effective Source Control. This plan could have incorporated elements of the joint industry report;[177] of the 1998 IADC materials;[178] of the 2001 BP scoping or planning questions by BP (Byrd, et al);[179] and/or the BP Alaska capping procedure best technology determination.[180]

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[172] TREX 9139/Document 7076 - Stipulated Facts (various items, and at item 137 for closing in the capped well).
[173] *See* Report, Section VI.A. above.
[174] TREX 60792.
[175] *Id.*
[176] TREX 9828.
[177] Neal Adams Firefighters, Inc., Final Report – Joint Industry Program for Floating Vessel Blowout Control (1991).
[178] TREX 7353.
[179] TREX 4423.
[180] TREX 9828.

5. BP performed many HAZID[181] protocols during various Source Control plans and procedures after the Macondo blowout. I have not seen, however, HAZID protocols by BP related to planning and what was necessary <u>before</u> the Macondo well was drilled as to plans for Source Control equipment and procedures if the BOP system was not effective.

[redacted]

[redacted]

8. BP should have had a proper and accurate pressure and temperature reading and monitoring system at the BOP system or wellhead to facilitate data collection for flow rate calculation and for use for any well flow or control event.[184] Having this data to calculate flow rates is critical for Source Control plans. In fact, knowing the flow rates accurately is important data from the well once Source Control goes beyond closing the BOP or until capping/venting is accomplished.[185]

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[181] HAZID or its variations determine hazards, *i.e.*, a hazard identification analysis or similar methodology.

[redacted]

[184] *Id.* This is existing equipment and technology and is not even at the level of "BAST".

[185] BP, in fact, did have flow rates from within a few days of the blowout to early May, 2010, but misrepresented the flow rates and began to waste time going forward until the well was

[redacted]

10. BP should have directed that the LMRP be released to clear the riser, cleared the riser by other means (cutting the riser or severing the riser with designed explosives),[187] and then the well would have been prepared to cap/vent. This preparation for capping/venting could have been accomplished in a few days for those specific work tasks.[188] Also, in fact, the LMRP was released after the well was cemented/plugged – it worked and released as it was designed;[189] and such factors as "blast" from the well flow was modeled as not being significant in this type of procedure (release of riser and landing BOP).[190]

11. In addition to the plans BP actually had encountered or thought about before Macondo,[191] but not used for Macondo (listed in paragraphs above); BP could have, using existing technology and equipment, simply planned, assembled, and added necessary adapters and achieved what Marine Well Containment Company ("MWCC") and BP itself ("Global Deepwater Well Cap and Tooling Package")[192] have in place now. These latter types of programs or equipment could have been in place for drilling and for Source Control at Macondo – existing pre-Macondo equipment and technology were used for the

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capped. *See* TREX 6110; TREX 8656; TREX 8865; TREX 9267; TREX 9274. All of thse documents have BP flow rate calculations.

[redacted]

[187] Commercial sources or Corps of Engineers or military resources to sever the riser with explosives – it just has to be pre-planned and analyzed; and have the services or options available before the well is drilled; or as needed after the blowout. *See also* TREX 10629.

[188] *See* Figure 5, attached; TREX 9139/Document 7076 - Stipulated Facts (see items for clearing and capping tasks).

[189] McWhorter deposition, November 15, 2012, at pages 145-149, 513-514; TREX 9139/Document 7076 - Stipulated Facts (see items for releasing LMRP).

[190] *Id.;* Wellings deposition, January 16-17, 2013, at page 365.

[191] TREX 3624; TREX 7353; TREX 9828; TREX 7353; *see also* Neal Adams Firefighters, Inc., Final Report – Joint Industry Program for Floating Vessel Blowout Control (1991). These are all Source Control and intervention materials and all were developed long before 2010 at Macondo.

[192] TREX 11259 - *With This 500-Ton Deepwater Well Cap, BP Is Ready For The Next Oil Spill*, Forbes (May 8, 2012) (article on BP capping stack capability and costs).

post-Macondo Source Control equipment – it just had to be asked for and bolted together. [redacted] The total cost of a capping/venting system (about 50 million dollars), could be absorbed by BP or even shared such as through MWCC, Helix, or a shared system assembled by a vendor such as Trendsetter Engineering.[194] In addition to potentially sharing costs among a number of operators, a capping stack has a long useful life so the amortized cost over a number of wells and over time becomes relatively insignificant when assessed to any individual well.

12. BP should have had, as part of its safety management and drilling plan, a capping stack with proper connector(s) (wellhead, top of BOP, LMRP, and riser Flex-joint options) designed, built, dressed, and staged before drilling began at Macondo. This equipment should, for maximum working or functional options, have venting or flow capability, such as if a soft as opposed to a hard BOP closure is desired. The equipment could be staged (for the Gulf of Mexico) at Houston, the Port of Fourchon, Mobile, *etc.*).

13. BP should and could have had a plan and logistics choreographed for containment and surface collection. This plan would include design, sourcing, contracts/sources and having dressed and staged surface loading and storage vessels, offloading and transport tankers (*i.e.*, to shore, refineries, or to a platform/pipeline), riser systems, flowlines or piping, collection domes, vent/partial flow systems, and installation equipment. *See* examples of existing technology before Macondo such as floating production and processing facilities; many of which were in use worldwide long before year 2010 at Figures 7 and 8, attached. BP could design and build whatever it needed for Source Control with technology that existed – BP just had to decide in advance what it needed.

[redacted]

[194] Wellings deposition, January 16-17, 2013, at pages 423, 432 (cost of capping stack); *see* Trendsetter Engineering, Inc. website (www.trendsetterengineering.com) for a description of well capping systems and the short time to assemble them (5 ½ to 8 weeks); *see also* TREX 60996 (BP spent much more than a capping/venting system or shared capping/venting system).

14. BP should and could have contained, collected, stored, and transported and sold the liquid hydrocarbons while capping/venting equipment was being placed, and/or while relief wells are drilled. Technology and systems were available before Macondo such as floating production systems, processing vessels, and storage (on-site and shuttle oil tankers) used worldwide for temporary, semi-permanent, and permanent storage/processing systems.[195] *See again* Figures 7 and 8, attached. Some oil fields are produced to floating systems offshore for the whole life of the well – while the economics are not as advantageous, the practical aspect is that the oil here could be contained and sold instead of flowing to the Gulf of Mexico.

15. The well should be capped/vented as soon as possible. This conforms with the BP Alaska (a) capping with pre-planned equipment and (b) relief wells pre-determination by BP Alaska.[196] Note: BP claims it was concerned about well integrity. [redacted] Ultimately, in spite of BP's apparent concern with [redacted] sea floor breech issues – the well was secured about July 15, 2010. All of these issues are BP's issues; and are part of Source Control planning. A BP consultant wrote a report dated October 17, 2011 that states, "The rupture disks [in 16-inch casing] were not a weak link in the system."[197]

16. As relief well(s) drilling takes longer in deepwater with more complicated, less certain, and time-consuming procedures as compared to land or shallower water operations, Source Control and capping the well more quickly becomes even more important to mitigate Source flow time and total volume.

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[195] *See* Figures 7 and 8, attached; *see also* Bibliography at Exhibit C for floating production system lists and inventories in industry magazines and publications; *see also* examples shown in Exxon Mobil "Well Containment System" at the Exxon website.
[196] TREX 9828.
[197] TREX 61000 - Review of the Production Casing Design for the Macondo Well, Expert Report by David Lewis Report of Blade Energy Partners (David B. Lewis), October 17, 2011, at pages 5-6.

17. The well when capped and closed on July 15, 2010, exhibited integrity – initial Source Control was accomplished.[198]

E. BP IS SOLELY RESPONSIBLE FOR SOURCE CONTROL FOR THE BP OPERATED WELL

1. [redacted] BP is solely responsible for Source Control at Mississippi Canyon Block 252 ("MC 252") for the Macondo well.

2. The sole responsibilities of BP include Source Control planning, implementation, the amount of oil spilled, and how long it takes to control the Source.

3. Once the Macondo well was flowing out of control, a number of regulatory and political factors came into play. Nevertheless, BP continued to make the recommendations and BP ultimately had each of its plans approved; and BP attempted to implement those plans.

4. As an extension of and result of the BP safety culture and process safety failures discussed in this report, BP also failed to follow [redacted] industry standards.[200]

5. Even though the "regulators" acted as a filter and as a source for higher levels of government and for the public to some extent, at least in taking up some level of time and keeping BP personnel occupied, I see no indication that the "regulators" made any substantial decisions or tried to do same.[201] *See* for example where the government in several documents says it does not have the ability, let alone the desire, to accomplish Source Control so must "rely wholly

198 TREX 2291 (shut in pressure determinations after July 15, 2010); BP Pressure Reports cited in the Bibliography at Exhibit C.
[redacted]
200 TREX 51497; TREX 45059.
201 McWhorter deposition, November 15, 2012, at pages 31-32.

on the responsible party, BP here, to contain oil spills occurring from one of their [BP] facilities".[202]

6. As one example of the interaction between and among BP and "regulators", Admiral Landry, as one FOSC,[203] stated that (a) there was authority in the "regulators" to enforce and direct the response and source control to be accomplished and to be efficient, but that (b) BP was not directed by the "regulators" to not take certain actions, and (c) "regulators" did "review" or "approve", but did not sign or have to sign all Source Control procedures. [204]

7. BP failed to comply with various standards [redacted] related to Source Control.[205]

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[202] Wellings deposition, January 16, 2013, at pages 115-116, 118-120; TREX 9105 - Report: On Scene Coordinator Report Deepwater Horizon Oil Spill Submitted to the National Response Team September 2011; TREX 9099 - Memo: US Dept of Homeland Security Final Action Memorandum - Incident Specific Preparedness Review (ISPR) Deepwater Horizon Oil Spill.

[203] FOSC is "Federal On-Scene Coordinator" under a designated National Contingency Plan.

[204] Admiral Landry deposition, October 22, 2012, at page 65, at pages 67-70, 76, 358-359; Smith deposition, October 25, 2012, at page 338.

[205] Summary of MMS standards, recommended practice, [redacted] related to Source Control:

1. BP did not perform its operations in a safe and workmanlike manner, and did not follow industry practice and standards (Methods of Source Control, API RP 53 (BOP system), and API RP 75 (SEMS/process safety)); [redacted]

8. BP is responsible for problems it creates. BP had no plan for Source Control. [redacted] Note: The bottom line is that the [redacted] sea floor breech issue were not problems – the well was shut in and had integrity.

[redacted]

3. The National Safety Council published a book (first edition year 1999) titled Safety Through Design. This book presents methods for "engineers and safety practitioners" to analyze design and to effectively address hazards. One guiding principal in the safety field is to follow the "design hierarchy". The design hierarchy states that hazards should first be removed from the system by hard engineering. In the instance of Macondo, this is support for pre-planning, dressing, and staging backup or replacement BOP systems – the well capping stack or BOP-on-BOP scenarios. The backup well capping system accomplishes the National Safety Council basic principle called "slow down the release of energy" and "isolation", and "impose barriers". The stated goals include "minimizing the severity of harm or damage if an incident occurs". *See* NATIONAL SAFETY COUNCIL, SAFETY THROUGH DESIGN 9 – 13 (NSC Press 1999).

[redacted]

F. HALLIBURTON ENTITIES HAVE NO RESPONSIBLITY:

- ARE NOT RESPONSIBLE FOR THE BP OIL SPILL RESPONSE PLAN ("OSRP") THAT DID NOT PLAN FOR SOURCE CONROL

- ARE NOT RESPONSIBLE FOR BP'S ATTEMPTED SOURCE CONTROL SEQUENCE OR TIMING

- ARE NOT RESPONSIBLE TO FORESEE THE MAGNITUDE OF BP'S FAILURES AND THEIR RESULT

- DID NOT FORESEE THE MAGNITUDE OF BP FAILURES AND THEIR RESULT

- DID NOT FORESEE THAT BP WOULD IMPEDE SOURCE CONTROL WHICH INTERVENED IN THE PROGRESS

1. Halliburton entities, as service providers on the Macondo well, are not responsible for the BP areas of responsibility discussed in this report. In addition, Halliburton had a contract with BP under which BP controlled the operation and Halliburton was limited as to its input.[207] On several illustrative issues, BP did not take suggestions or overruled contractor suggestions (*e.g.*, [redacted] the decision to bullhead into the well after it was capped).[208]

2. Halliburton entities should be able to rely on the Responsible Party or Operator, BP here, for controlling the well, for safe and prudent engineering, for proper pre-planning, well plans and design, for well and BOP integrity, for proper, reasonable and prudent decisions, [redacted] and for problem

[207] TREX 60371 - Contract for Gulf of Mexico Strategic Performance Unit Offshore Well Services between BP Exploration and Production, Inc. and Halliburton Energy Services, Inc. (BPM-09-00255).

[208] [redacted] Campbell deposition, July 12, 2011, at page 220.

solutions using BAST, below-BAST technology, and industry standards and practice.

3. Halliburton entities, as service providers on the Macondo well, should be able to rely on the Responsible Party or Operator, BP here, to have the capability BP knew was necessary for Source Control and to properly and timely implement Methods of Source Control for the Macondo well.

4. As to Phase II – Source Control, the Halliburton entities did not contribute to any failure of BP.

5. To date, I have seen no deposition testimony or other documents related to Phase II – Source Control that indicates, in my opinion, responsibility on the part of Halliburton entities.

VII. CONCLUSION

A. The Macondo Source Control failures were failures of BP. The failures include: [redacted] (b) not implementing such plans as the IADC,[209] DEA-63,[210] and MMS/West[211] well intervention methods developed in the industry many years before Macondo; (c) not following industry standards; (d) failing to use and implement process safety principles and plans; (e) having no effective means pre-planned and prepared to accomplish Source Control; and (f) failing to timely accomplish Source Control.

B. The failures of BP set forth in this report resulted in extended Source Control time. Those many days of extended Source flow time totaled about 60 to 80 extra days; as discussed in the report. Those 60 to 80 days added significant volume to the uncontrolled Source flow.

[209] TREX 7353.
[210] Neal Adams Firefighters, Inc., "Final Report – Joint Industry Program for Floating Vessel Blowout Control" (December 28, 1991).
[211] TREX 3624.

C. BP, as the Responsible Party and Operator of the well, was solely responsible for the failures set forth in this report and for Source Control.

D. The failures of BP to properly progress with Source Control as outlined in this report resulted in BP impeding Source Control efforts at Macondo.

E. [redacted]

F. Halliburton entities did not contribute to nor cause any failure to accomplish Source Control.

G. Halliburton entities had no responsibility for the failures set forth in this report related to Source Control.

VIII. FINAL REPORT (BASED ON REVIEW TO DATE); FUTURE WORK

A. The Opinions and Conclusion in this report are final and not preliminary based on information reviewed as of this time.

B. My review has included the reports of Gregg Perkin and Robert Bea. I agree with the Perkin and Bea reports in general terms as regards BP; but I may have comments or distinctions if questioned as to their reports, opinions, or conclusions.

C. The review of additional information might require modification of my opinions.

FIGURE 1
Ziegler Rpt
May 1, 2013

WELL LOSS OF CONTROL SCENARIOS

ONCE A WELL BEGINS TO FLOW THESE EVENTS CAN OCCUR

1. BOP system can (immediately or later) be closed to shut off flow from the Source downhole. A well cap, capping stack, BOP-on-BOP, or replacement BOP system (all with venting components) is part of the "later" option (time frame of "later" not defined – can be very quick; might be longer).

2. Wellbore might bridge or plug-up.

3. The Source might deplete relatively quickly or flow saltwater from the Source that kills the well flow.

4. Cross-flow from Source to other geologic zones (or "underground blowout") might occur downhole so Source does not flow to the surface or sea floor.

5. Source fluids captured or contained at surface or sea floor. Capture fluids from source either at top of BOP system or flowline at rig, or from venting/choke/restriction outlets on BOP or capping system.

6. Source might be "killed" or plugged by injection of bridging materials.

7. Source might be "killed" or overcome by circulation or injection of heavy materials (hydrostatic kill).

8. Source might be "killed" by cementing or other plugging materials.

9. Source might be "killed" or overcome by relief well intersection or close approach to the source or well and related procedures.

10. The Source might continue to flow out of control and not be stopped.

FIGURE 2
Ziegler Rpt
May 1, 2013

METHODS FOR SOURCE CONTROL

THIS IS A PRIORITY OR HIERARCHY TO CONTROL A SOURCE

1. Primary Method of Source Control - Maintain the well in a no-flow situation. Usual tool is drilling fluids/drilling mud. This Source Control method is usually called maintaining hydrostatic control of the Source.

2. Secondary Method of Source Control - A barrier or barriers between the Source and the top of the well. Examples of barriers are the well casing and wellheads/seals. Some in the industry include drilling mud (hydrostatic control) as a barrier, but I consider a "barrier" as a hard, engineered piece of equipment.

3. Tertiary Method of Source Control - The blowout preventer system ("BOP" or "BOP system").

4. Quaternary Method of Source Control – Capture, collection, or containment (domes, hats, venting, choking, and restricted flow).

5. Fifth Method of Source Control – Cap, replace BOP, add or repair features – redundant/repaired/replaced Tertiary Method. May vent or capture, etc., after/during capping.

6. Sixth Method of Source Control – Relief wells.

FIGURE 3
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May 1, 2013

MACONDO METHODS FOR SOURCE CONTROL

Note: Steps in this list are inclusive and could occur simultaneously or in conjunction with each other in a preplanned sequence. Accomplishing some steps may obviate the need for other steps.

1. WELL DESIGN, OPERATIONS AND PROCEDURES TO AVOID FLOW FROM WELLBORE TO SURFACE/RIG (Hydrostatic and Barriers)

2. CLOSE BOP SYSTEM TO SHUT OFF AND CONTROL SOURCE

3. RELEASE RISER (Riser Option 1)

4. MOVE RIG OFF WELL

5. CLOSE BOPs (LOWER PACKAGE) WITH ROV

6. CUT AND REMOVE RISER (Riser Option 2)

7. BLOW OFF AND REMOVE RISER (Riser Option 3)

8. COLLECT FLOW – FLOWLINES OR CAPTURE SYSTEM

9. CAP WELL

10. SHUT CAPPED WELL IN OR VENT/CAPTURE FLOW

11. DRILL RELIEF WELLS

FIGURE 4
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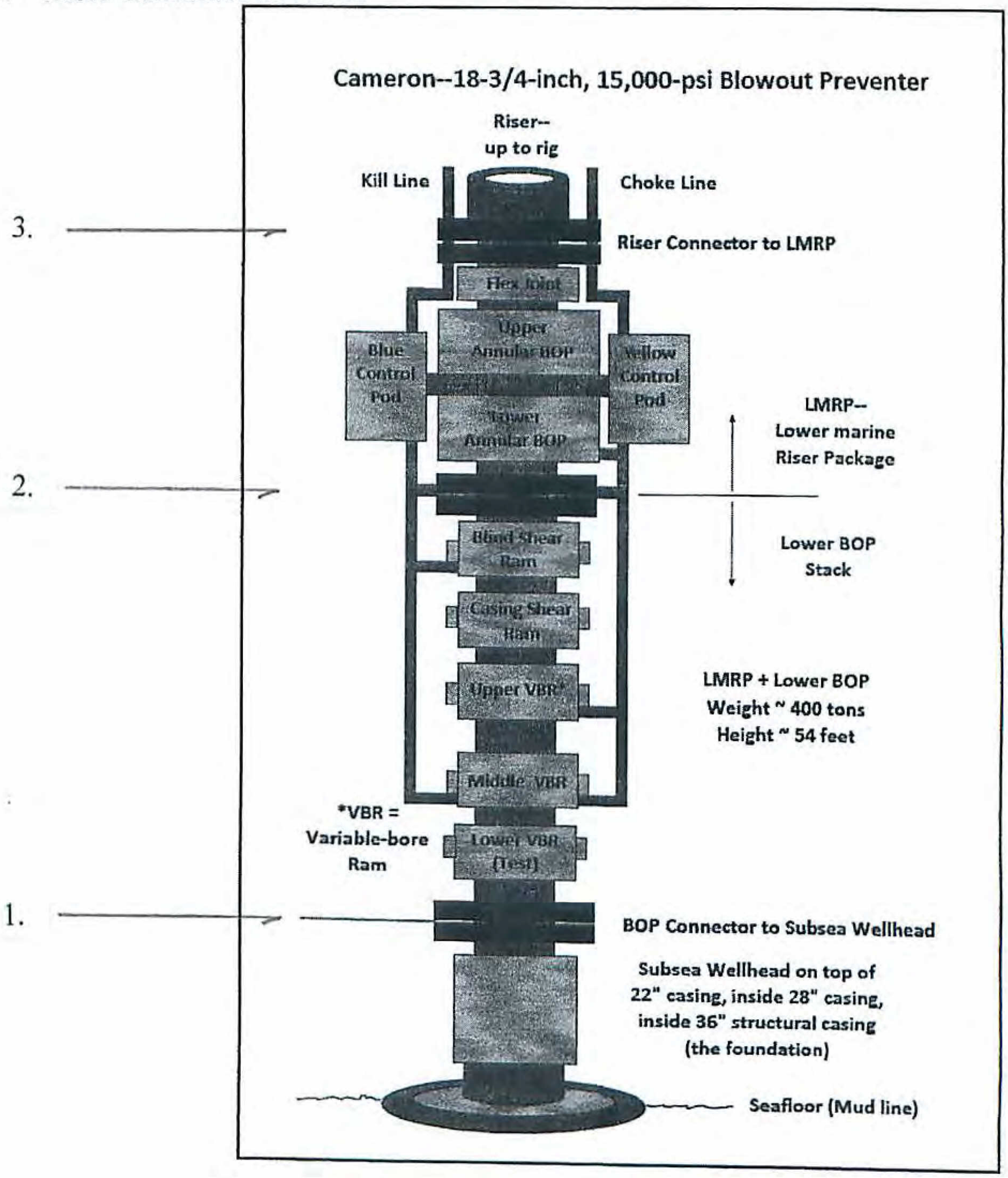
May 1, 2013

BOP EQUIPMENT USED ON THE MODU *DEEPWATER HORIZON*

FEASIBLE POINTS OF CAPPING STACK INSTALLATION ARE:

1. BOP Connector to Subsea Wellhead
2. LMRP to BOP Stack Connector
3. Riser Connector to LMRP



Drawing Source: Turley, J.A., The Simple Truth (2012)

FIGURE 5
Ziegler Rpt
May 1, 2013

TIME LINE OR DISCREET TASKS TO ACCOMPLISH CAPPING

1. Mobilize capping equipment to site	Items 104, 105, and 110	3 days **
2. Remove riser – cut with hydraulic shears	Item 90	1 day **
3. Clear capping area (See Figure 4) – can release LMRP, can remove BOP, or can unbolt riser connector (prefer to release LMRP)	Item 123	1 day **
4. Install cap	Item 127	1 day **
Total Capping Time (with one day contingency added)		7 days

** See TREX 9139 which is Document 7076 – Stipulated Facts.

Note: In an Marine Well Containment Company ("MWCC") drill, a Cap was mobilized and a rehearsal installation occurred in the Gulf in about 4 days.

Matrix of Issues – Secondary Intervention

Question: Will the system in place successfully address the issue delineated?

Fast Response = Can the system be deployed in sufficient time to ensure the function is completed before high flow rates damage well control equipment.

Capability = Does the speed at which the function occurs comply with API Spec 16D, Section 2.2.2.1 and API RP 53, Section 13.3.5.?

Issue	Deadman	AMF	EDS	Auto Disconnect	Autoshear	Acoustic	EHBU	ROV Intervention
Fast Response	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Sufficient Capability	Yes	Yes	Yes	Yes	Yes	Maybe, dependent on hydraulic flow rates	Yes	No
Is this a stand alone system?	Yes	No, uses SEM and pod valves	No, uses MUX system	Yes	Yes	Yes	No, uses MUX cables	Yes
Works well in adverse environmental conditions?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Automatically initiated if riser & cables parted?	Yes	Yes	No	No	No	No	No	No
Automatically initiated by loss of surface electrical control system combined with loss of hydraulic supply	Yes	Yes	No	No	No	No	No	No
Works in presence of mud plume or noise	Yes	Yes	Yes	No, must be combined with Autoshear	Yes	Maybe, system dependent	Yes	Yes
Capable of containing well if LMRP accidentally disconnected, well kicks (hydrostatic head lost)	Yes	No	No	No, must be combined with Autoshear	Yes	Yes	No	Maybe, dependent on well flow rate
Capable of manually securing non flowing well	No	No	Yes	No	No	Yes	Yes	Yes

Assumptions: A1) ROV is deployed, not equipped with intervention stab. A2) ROV output = 4.5 gpm (7 min). A3) Secondary intervention systems are armed. A4) Acoustic system transducers deployed. A5) Accumulator volumes are adequate

FIGURE 6
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FIGURE 7
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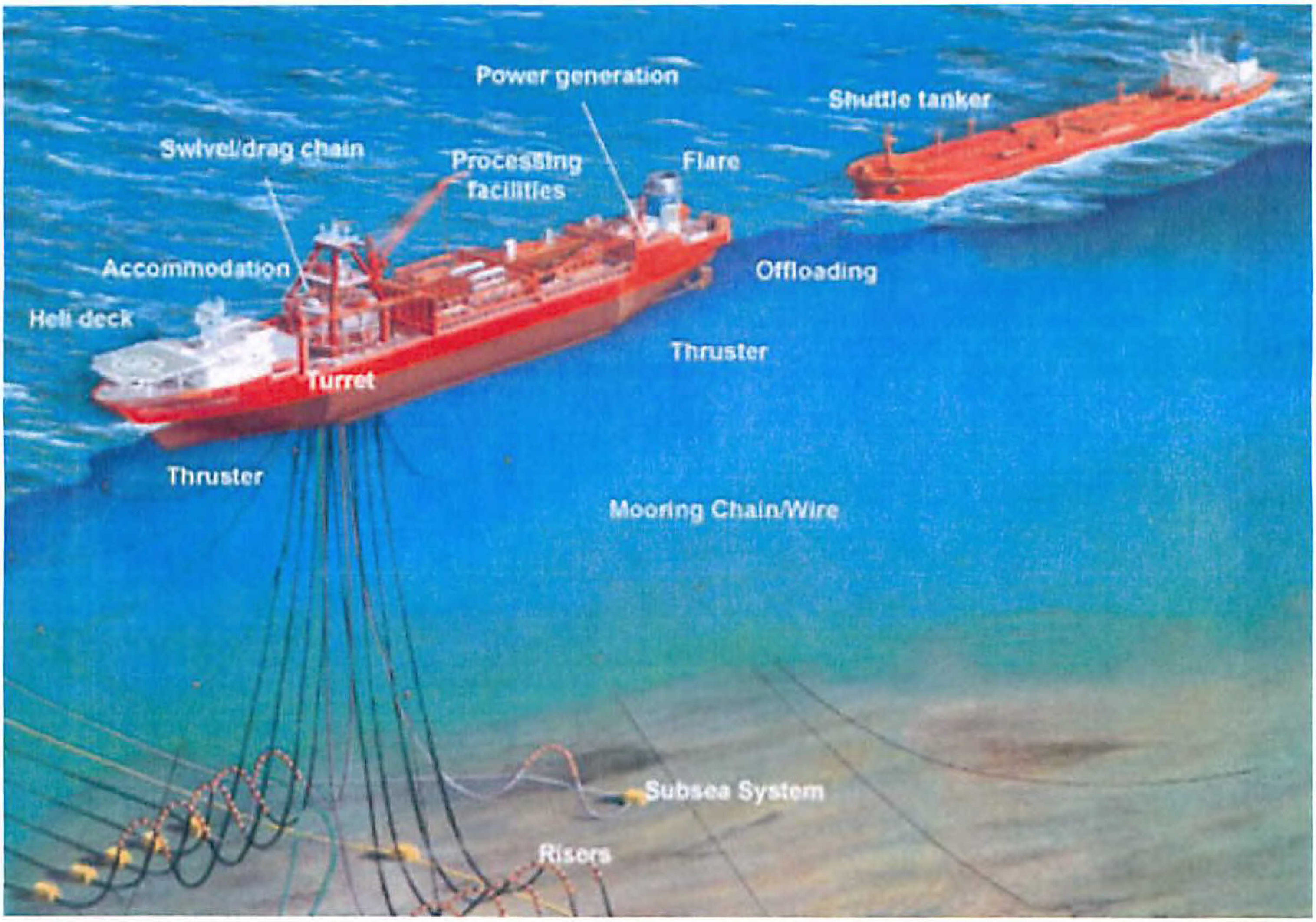

FIGURE 8
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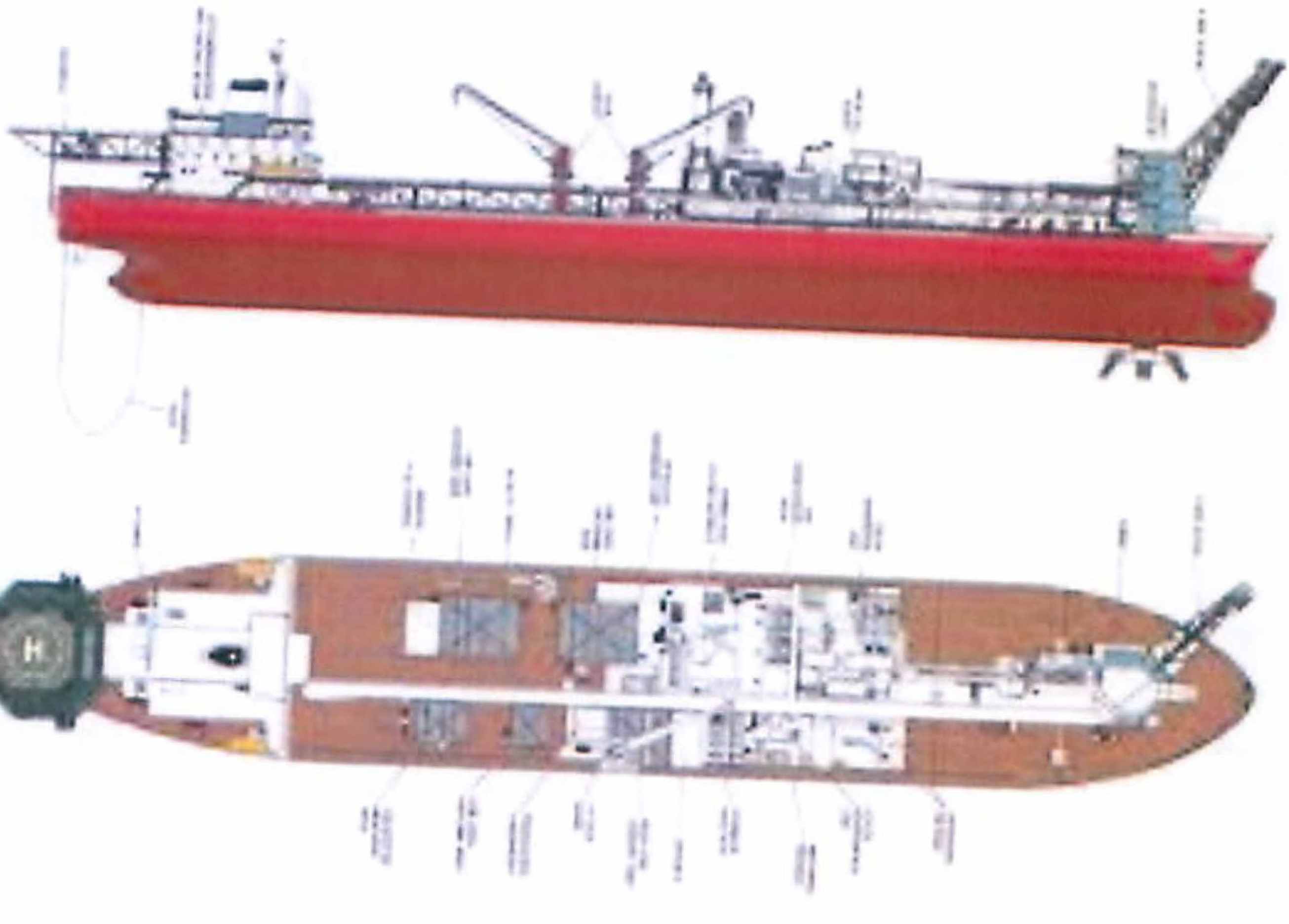

Risktec

Bow-tie diagram

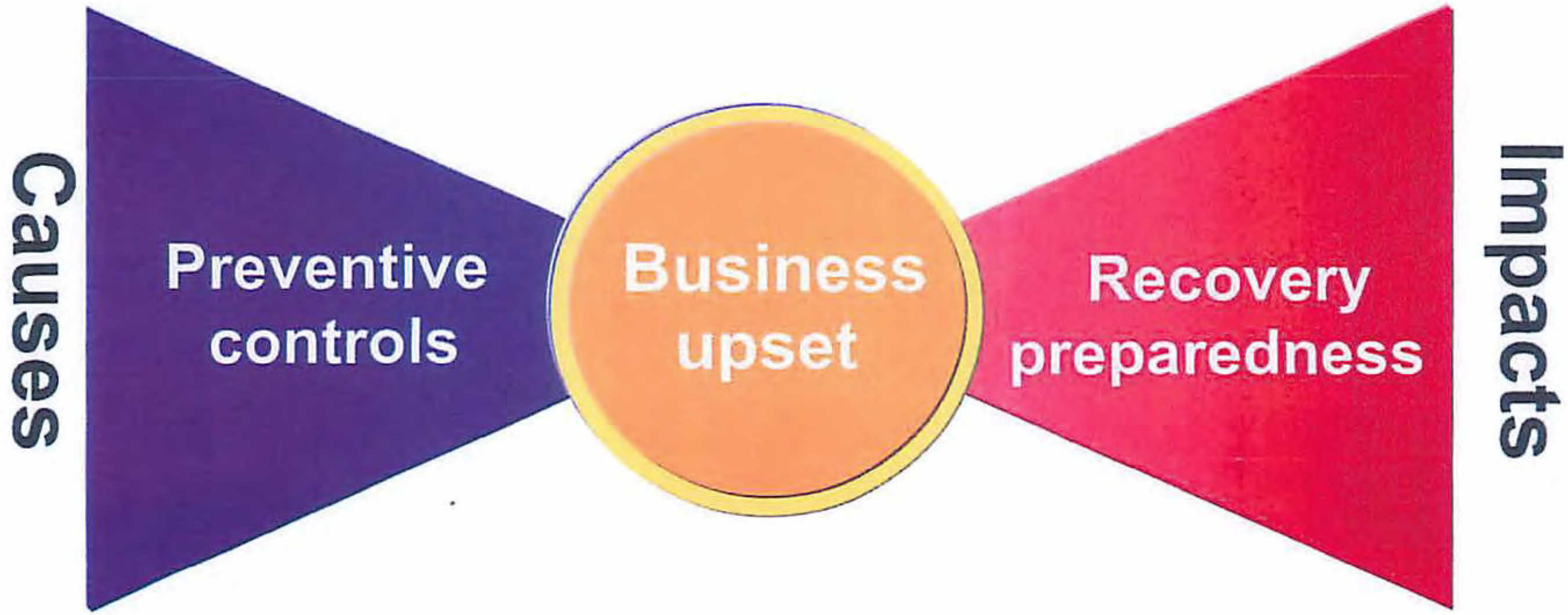

FIGURE 9
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FIGURE 10
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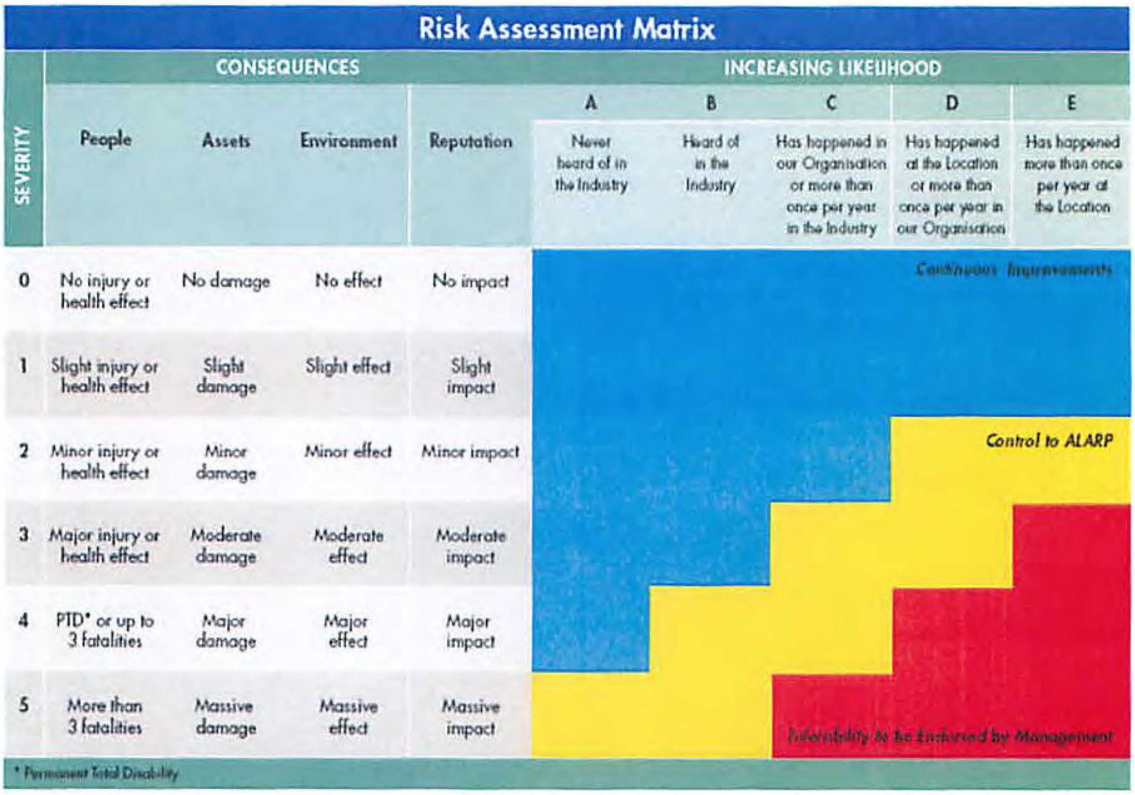
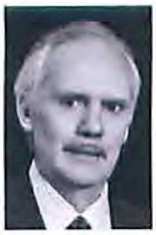


Source: Energy Institute, 61 New Cavendish Street, London, UK (2007)

Exhibit A

EXHIBIT A
Ziegler Rpt
May 1, 2013



EDWARD R. ZIEGLER, P.E., C.S.P.

1964 West Gray, Suite 201 Houston, Texas 77019
Telephone: (713) 850-0960 Facsimile: (713) 850-1235

EDUCATION:

B.S. Petroleum and Natural Gas Engineering (1972)
Pennsylvania State University

Juris Doctor (1979)
University of Pittsburgh (Two Years) / South Texas College of Law (Degree)

M.S.-level Safety Engineering Courses and Research (1994 – 2003)

EXPERIENCE:

ZIEGLER-PERU, INC. 1993 to Present
Operate wells and own drilling rigs. Drilled wells in Texas, Pennsylvania, and Peru. Drilled 100+ wells 500 feet to 2450 feet depth in years 2006 to present.

PETROLEUM AND SAFETY CONSULTING 1981 to Present
Oilfield, construction, and safety management. Safety audits, OSHA, operations, engineering, safety programs, design, industry standards and practices.

MAINTENANCE AND WELDING COMPANY 1987 to 1989
Oilfield, plant and maritime industries providing labor and services.

HOME PETROLEUM CORPORATION 1977 to 1981
Drilling and Production Manager. Management, operations, construction, pipeline, and safety responsibility. Geographic area U.S., offshore, and international. Well depth 600 feet to 21,000 feet. Much field work for problem solutions.

MARATHON OIL COMPANY 1972 to 1977
Various engineering responsibilities, including drilling, safety, production, reservoir, construction. Toolpusher on company-owned rigs. Drilling, construction and production onshore, offshore and international.

PROFESSIONAL:

Registered Professional Engineer - Texas (Since 1986)
Certified Safety Professional (Since 1990)
OSHA 500 Instructor training (1993, 2004)
Member ANSI Z49 Welding Safety Committee (Since 2002)
Society of Petroleum Engineers - Gulf Coast Chapter Safety Committee (1991-1993) (Charter Member)
Safety Committee, Associated Builders and Contractors (1992-1995)
Texas Workers' Compensation Commission Extrahazardous Employer Approved Professional Source (1992-1996)
State Bar of Texas (Since 1980)
American Society of Safety Engineers (Since 1989)
Certified as crane operator, welder, for well control (Various years)
Member IADC, SPE (Since 1972) (Some safety committee service)

Exhibit B

EXHIBIT B
Ziegler Rpt
May 1, 2013

TEXAS BOARD OF PROFESSIONAL ENGINEERS

This card certifies that
EDWARD RAY ZIEGLER
Is a Licensed Professional Engineer

P.E. License Number	Status	Expiration Date
58596	ACTIVE	9/30/2013

P.E. Signature — TBPE Executive Director

Society of Petroleum Engineers

SPE International

Mr. Edward R Ziegler
1235324
Member

Expiration 12/31/2013
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Having met the applicable requirements defined by its bylaws, BCSP hereby authorizes the use of

Certified Safety Professional (CSP)
to
EDWARD RAY ZIEGLER

Expires on	Certificate #	Recertify by
12/31/2013	10581	12/31/2018

SECRETARY

AMERICAN SOCIETY OF SAFETY ENGINEERS

1800 E. Oakton Street • Des Plaines, IL 60018-2187

Edward R Ziegler P.E., CSP
Member
Chapter: Gulf Coast
Number: 000128523
Join Date: 7/90

Executive Director

OSHA U.S. Department of Labor Occupational Safety and Health Administration National Training Institute

Edward R. Ziegler
Has completed the
INSTRUCTOR COURSE IN OCCUPATIONAL SAFETY AND HEALTH STANDARDS FOR THE CONSTRUCTION INDUSTRY, [illegible],
and is authorized as a 10- and 30- hour Construction Outreach Program Trainer.

Director — 10/29/93 Course Date

TEXAS WORKERS' COMPENSATION COMMISSION
Approved Professional Source
[illegible]
Edward R. Ziegler
[illegible]
TWCC [illegible]
Nov 16, [illegible]

MATERIAL INTENDED TO COMPLY WITH

FRCP RULE 26 AND SIMILAR REQUIREMENTS

Edward R. Ziegler, P.E., C.S.P.

Compensation

All consulting work is billed by the hour at the rate of US$ 195.00 and then US$ 295.00 per hour.

This hourly rate is the same for all types of consulting work, including petroleum engineering, safety and litigation (same for document review, depositions, trial, etc.).

All expenses are billed at cost.

A day rate may be negotiated for out-of-town travel or for extended jobs or contracts.

No retainer is requested. Terms are net due thirty (30) days unless other arrangements are made in advance.

Publications

1. **ROAR - June 1991**
   - "Environmental warning from expert to Royalty Owners"
   - Volume 11, No. 12

2. **Newsletters – "The Ziegler Report" - 1992 through 2013**

LIST OF TESTIMONY

LEGEND: TRIAL (T)
DEPOSITION (D)
HEARING (H)
AFFIDAVIT (A)

NOTE: This list of cases here was originally developed from files and data to create a list when Rule 26 required this information. After the first summary, a list has been kept and updated with new cases in which testimony has been given during each four-year time period.

2009

Ring v. Formosa Plastics Corp., D, T
135th District Court Calhoun County, TX
Cause #08-03-0450

Noyola v. Brand Services D, A, T
412th District Court Brazoria County, TX
Cause #43835

Factor v. Bynum, et al D
District Court Pontotoc County
Cause #C-05-429

Baldonado, et al v. El Paso Natural Gas D, T
5th District Court Chaves County
Cause #D-504CV-2003-00465

Williams v. Precision Drilling D, T
District Court Oklahoma County
Cause #CJ-2005-5096

Sandel v. Quality Banana Inc. D
113th District Court Harris County
Cause #2008-26192

English v. Bay LTD., et al A, D, T
28th District Court Nueces County
Cause #07-6784-A

Hulstine, et al v. Lennox Industries, et al T
4th District Court Missoula County, MT
Cause #DV-06-187

Vasquez v. Bosch Tool, et al D
USDC District of Texas
Cause #4:07-CV-04473

Rojas v. EOG Resources, et al D
71st District Court Harrison County
Cause #08-0120

Binyon v. Capital Excavation Co. D
419th District Court Travis County
Cause #D-1-GN-07-003996

Petrie v. Quicksilver Resources, et al D
152nd District Court Harris County
Cause #2008-05215

Schrader v. Gray Television Group A, D
15th District Court Grayson County
Cause #08-1424-015

Knolls v. Range Operating D, A
43rd District Court Parker County
Cause #CV108-1470

2010

Wise v. Diamond Offshore Drilling — T
USDC — Galveston Division
Cause # G-07-066

Knolls v. Range Operating — T
43rd District Court — Parker County
Cause #CV108-1470

Hull v. Enogex — D
District Court — Cleveland County
Cause #CJ-2009-1053

Lord v. Phillips 66 Company — D, T
Circuit Court — Jefferson County
Cause #2007-09

Trail Enterprises v. The City of Houston — H
Law Number One — Harris County
Cause #799,234

Migl v. Watson Pipe, et al — D
District Court — Lavaca County
Cause #07-05-20634-CV

Moss v. SST Energy Corp. — D
District Court — Sublette County
Civil #2008-7314

Lofton v. Phillips 66 Company — D, T
2nd District Court — Jones County
Cause #2006-106-CV3

Ruiz v. All Star Metals — D
138th District Court — Cameron County
Cause #2008-03-1550-B

Fluke v. Makena Sales — D
266th District Court — Erath County
Cause #CV29806

Petrie v. Quicksilver Resources, et al — T
152nd District Court — Harris County
Cause #2008-05215

Shaklee v. Basic Energy Services, et al — D
USDC — District of Utah
Cause #2:08-cv-00883

Hernandez v. M-I SWACO — D
County Court — Galveston County
Cause #62, 268

2011

Beck v. Patterson-UTI Drilling District Court Santa Fe County Cause #D-0101CV-2008-00124	D	Brandt v. J.D. Field Services District Court Uintah County Cause #070800334	D
Brown v. Phillips 66 Company, et al Circuit Court Smith County Cause #2006-196	D, T	Reed v. Besco Tubular LLC, et al USDC District of Louisiana Cause #2009-10-686	A
McKissack v. Rowan Companies 295th District Court Harris County Cause #2009-60733	D	Fairchild v. Phillips 66 Company, et al Circuit Court Jones County Cause #2006-98-CV3	D, T
Nix v. AGCO Corp., et al Circuit Court Jones County Cause #2010-85-CV8	D, T	Wall v. Delta Superior Court Benton County Cause #09-2-00752-4	A, D
Patron v. Baker Hughes, et al 37th District Court Bexar County Cause #2009CI10015	D	Jent v. Precision Drilling USDC District of Wyoming Case #10-CV-285J	A
Thrash v. Phillips 66 Co. 2nd District Court Jones County Case #2006-574-CV11	D	Moore v. Petro-Canada Resources 6th District Court Campbell County Cause #30417	D
Porter v. San Lorenzo Church 243rd District Court El Paso County Cause #2009-4360	A	Hedgepeth v. Diamond Offshore 133rd District Court Harris County Cause #2010-61705	D

2012

Porter v. San Lorenzo Church — D, A, T
243rd District Court — El Paso County
Cause #2009-4360

Floyd v. Phillips 66 Company — D
Circuit Court — Jasper County
Cause #16-0036

Brown v. Phillips 66 Company, et al — T
Circuit Court — Smith County
Cause #2006-196

Pasillas v. Citation Oil & Gas — A
USDC — District of Oklahoma
Cause #2011-cv-1092-R

Mendez v. Atmos Energy Corp. — D
68th District Court — Dallas County
Cause #11-13084

LeFlore v. Waste Management — D
5th District Court — Eddy County
Cause #CV-2011-00742

Walden v. John Crane, et al — D
Circuit Court — Jackson County
Cause #CI-2011-008-AS

Fluke v. Makena Sales — T
266th District Court — Erath County
Cause #CV29806

Bridwell v. Buffalo Pumps — D
District Court — Parish of Orleans
Cause #2011-5351

Hedgepeth v. Diamond Offshore — T
133rd District Court — Harris County
Cause #2010-61705

Weems v. A.W. Chesterton, Inc. — D
22nd District — City of St. Louis
Cause #1122-CC09330

Rojas v. San Lorenzo Church — D
County Court — El Paso County
Cause #2006-1669

Maes v. Palmer — T
1st District Court — Laramie County
Civil Action #177-765

Camacho v. Tom Cat Drilling — D
District court — Oklahoma County
Cause #CJ-2010-6948

2013

Taylor, et al v. Tesco Corp., et al D
USDC District of Texas
Cause #4:11-CV-00517

Exhibit C

EXHIBIT C
Ziegler Rpt
May 1, 2013

BIBLIOGRAPHY

LIST ONE: Documents provided by Attorneys for Halliburton entities.

Note: I rely on all of the depositions for Phase I and Phase II, and some are specifically listed below. All depositions were provided with exhibits listed in the deposition index. Depositions may have multiple volumes.

1. Deposition of David Barnett and exhibits
2. Deposition of Patrick Campbell and exhibits
3. Deposition of Kevin Cook and exhibits
4. Deposition of Henry Charles and exhibits
5. Deposition of Charlie Holt and exhibits
6. Deposition of Lt. Nathan Houck, USCG and exhibits
7. Deposition of Rear Admiral Mary Landry, USCG and exhibits
8. Deposition of Richard Lynch and exhibits
9. Deposition of Douglas Martin and exhibits
10. Deposition of J. Greg Rohloff and exhibits
11. Deposition of George Ross and exhibits
12. Deposition of Trevor Smith and exhibits
13. Deposition of Paul Tooms and exhibits

14. Deposition of Robert Turlak and exhibits

15. Deposition of James Wellings and exhibits

16. Deposition of Sec. Steven Chu and exhibits

17. Deposition of Steve Hand and exhibits

18. Deposition of Richard Harland and exhibits

19. Deposition of William Lehr and exhibits

20. Deposition of Michael Mason and exhibits

21. Deposition of Marcia McNutt and exhibits

22. Deposition of Robert Merrill and exhibits

23. Deposition of Mark Patteson and exhibits

24. Deposition of Earnest Bush and exhibits

25. Deposition of Mark Havstad and exhibits

26. Deposition of George Graettinger and exhibits

27. Deposition of Lars Herbst and exhibits

28. Deposition of Tanner Gansert and exhibits

29. Deposition of Kevin Devers and exhibits

30. Deposition of Tom Hunter and exhibits

31. Deposition of Ronald Dykhuizen and exhibits

32. Deposition of Paul Hsieh and exhibits

33. Deposition of Andy Inglis and exhibits

34. Deposition of Neil Shaw and exhibits

35. Depositions of David McWhorter and exhibits (Phase I and Phase II)

36. Deposition of William Stringfellow and exhibits

37. Deposition of William Miller and exhibits

38. Trial Testimony (Phase I) – Robert Bea and Glen Benge.

39. Report of Paul Hsieh with supporting materials (2010)

40. Report of Robert Bea with supporting materials (August 26, 2011)

41. Report of Robert Bea with supporting materials (April 5, 2013)

42. Report of Patrick Hudson with supporting materials (October 17, 2011)

43. Report of David M. Pritchard with supporting materials (2011)

44. Report of Gregg S. Perkin, with supporting materials (March 22, 2013)

45. Report of Nathan Busnell with supporting materials (March 22, 2013)

46. Report of David Lewis with supporting materials (October 17, 2011)

47. Report of Ronald Dykhunizen with supporting materials (March 22, 2013)

48. Report of Stewart Griffiths with supporting materials (March 22, 2013)

49. Report of Mohan Kelkar with supporting materials (March 22, 2013)

50. Report of Darvish Pooladi with supporting materials (March 22, 2013)

51. Report of Aaron Zick with supporting materials (March 22, 2013)

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MDL NO. 2179

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

EDWARD R. ZIEGLER, P.E., C.S.P.
EXPERT REPORT CONSIDERATION MATERIALS
MAY 1, 2013

EXHIBIT C

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