

IN THE UNITED STATES DISTRICT COURT FOR THE EASTERN
DISTRICT OF LOUISIANA

IN RE: OIL SPILL BY THE OIL RIG MDL NO. 2179 "DEEPWATER
HORIZON" IN THE GULF OF MEXICO, ON APRIL 20, 2010

Response to Expert Report of Kenneth E. Arnold of 15 August 2014 and Response to
Expert Report of Professor David L. Sunding of 15 August 2014

EXPERT REPORT OF
GARDNER W. WALKUP, JR.
ON BEHALF OF
THE UNITED STATES OF AMERICA



SEPTEMBER 12, 2014

A handwritten signature in black ink that reads "Gardner W. Walkup, Jr." The signature is written in a cursive style with a clear "JR" at the end.

Gardner W. Walkup, Jr.

DATED: September 12, 2014

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Appendix A – Considered Materials

1 Executive Summary¹

In this report, I respond to Dr. Sunding's² and Mr. Arnold's³ expert reports of 15 August 2014.

As summarized in Section 2, it is my opinion that:

- Dr. Sunding's empirical analysis is flawed and does not support his conclusions regarding capital investment in deepwater activities.
- An alternative, more pragmatic analysis of recent deepwater activity contradicts Dr. Sunding's assertions.
- Dr. Sunding has misapprehended the relationship between Operators and Non-Operating Parties ("NOPs") and as a result his cited literature does not apply to the specifics of this case and cannot be used to support his conclusions regarding the imposition of CWA penalties.

As summarized in Section 3, it is my opinion that:

- NOPs pursuing industry best practice can influence safety culture and thus improve the quality of offshore safety.
- Offshore safety also depends on factors beyond just culture (as contended by Mr. Arnold) and NOPs can contribute to these factors as well.
- Offshore safety also goes significantly beyond "operations" (as contended by Mr. Arnold) and NOPs can and do positively impact these other areas, in addition to contributing to operational issues.
- Mr. Arnold's contention that only Operators should be held responsible for safety is based on his incorrect view that NOPs cannot contribute to HSE performance.

As summarized in Section 4, it is my opinion that both Dr. Sunding's and Mr. Arnold's contention that NOPs lack the capacity and information to influence HSE performance of deepwater activities is incorrect. Rather, based on my experience and as documented in industry literature, it is my opinion that NOPs have both the capacity and information to positively influence HSE. I support my opinion, and rebut the contentions of Dr. Sunding and Mr. Arnold, by reviewing Anadarko's actions as a NOP at Macondo.

As summarized in Section 5, it is my opinion that the imposition of material CWA penalties on both BP (as operator) and Anadarko (as NOP) better serves the interest of the public than penalties solely on BP.

¹ The information in Section 2 of my initial report ("Information Required by the Federal Rules of Civil Procedure") has not changed and is incorporated into this report by reference.

² Expert Report of Professor David L. Sunding, dated 15 August 2014 ("Sunding Report").

³ Expert Report of Kenneth E. Arnold, dated 15 August 2014 ("Arnold Report").

2 Review of Sunding Report

First, Dr. Sunding's empirical analysis concerning non-operators' activity in the Gulf is flawed because it does not properly account for well-known industry realities. I have completed my own analysis of recent industry deepwater activity in the Gulf of Mexico, which contradicts Dr. Sunding's conclusions. Second, Dr. Sunding misapprehends the nature of the relationship between operators and NOPs when he characterizes them as "passive investors" and accordingly his cited literature does not support his conclusion concerning penalties.

In this section I present:

- Dr. Sunding's empirical analysis is flawed (Section 2.1).
- An alternative, more pragmatic analysis of recent deepwater activity, contradicts Dr. Sunding's assertions (Section 2.2).
- Dr. Sunding has misapprehended the relationship between Operators and NOPs and thus his cited literature does not apply (Section 2.3).

2.1 Empirical trends in NOP participation in deepwater activities

2.1.1 Dr. Sunding's analysis of lease ownership

In Section II of his report, Dr. Sunding contends that "*imposing penalties on non-operating investors will deter capital investment in deepwater exploration and production.*"⁴ Dr. Sunding suggests that just the threat of such actions has already changed the behaviors of industry participants and this change in industry behavior supports his contention about reduced capital investment if a penalty is imposed on Anadarko. I disagree that the empirical evidence suggests the threat of imposing CWA penalties has reduced deepwater activity. Dr. Sunding's statistical analysis is flawed due to his lack of understanding of the E&P business.

2.1.1.1 Leasehold ownership and economic activity

In his report, Dr. Sunding states that deepwater activities create an important source of economic activity. This economic activity is primarily driven by the capital spending during exploration and production and the revenue (both public and private) generated during production. However, Dr. Sunding's analysis focuses only on leasehold ownership. Leasehold ownership, and changes to that ownership position, has very little impact on the economic contributions of deepwater activities. A more meaningful analysis would focus on the trends in exploration and development activity and any

⁴ Sunding Report at 16.

changes in these trends. I have performed such an analysis in Section 2.2, which contradicts Dr. Sunding's conclusions.

2.1.1.2 High impact industry dynamics ignored in Sunding's analysis

The conclusions that Dr. Sunding draws from his statistical analysis of leasehold ownership before and after December 15, 2010 are flawed because he made the very large assumption that any changes were due to the public filing of a complaint indicating possible CWA penalties being imposed on the NOPs at Macondo. This assumption demonstrates Dr. Sunding's lack of familiarity with the E&P business. A number of other, larger events and trends occurred within the timeframe of Dr. Sunding's analysis that he has not accounted for in anyway. These include:

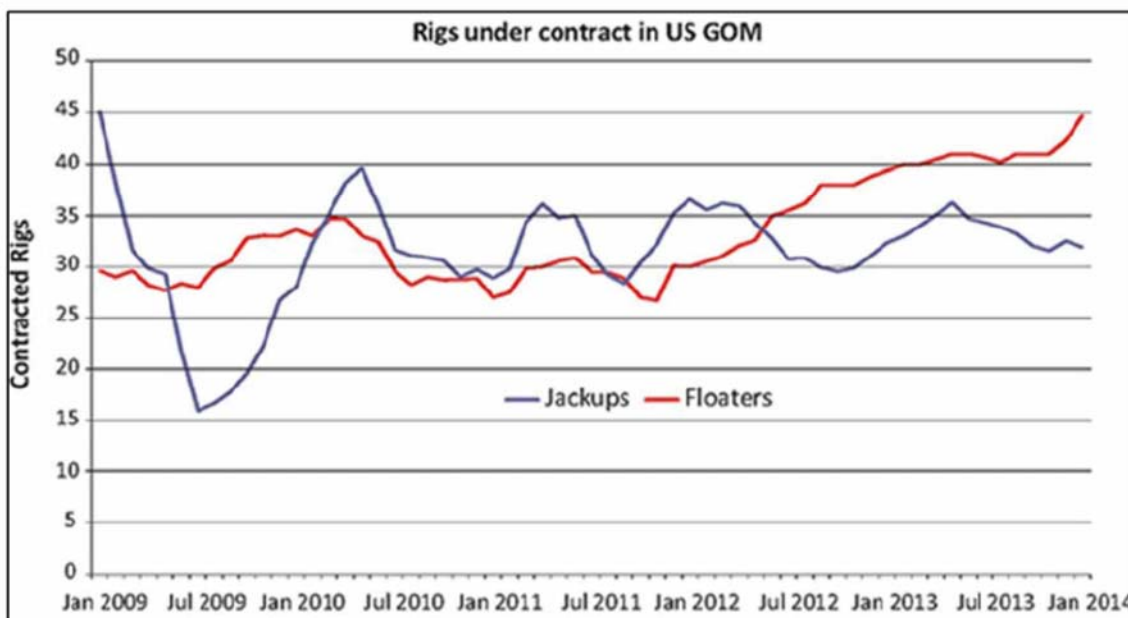
- The industry trend of Gulf of Mexico E&P participants evolving towards the more technically challenging, and much more costly lower tertiary projects, which is changing the mix of market participants with majors playing a bigger role and smaller independents leaving the market.
- The moratorium on deepwater activity imposed by the US government in the wake of Macondo created significant delays and a resulting portfolio reallocation away from deepwater for some players.
- The emergence of compelling onshore North American opportunities resulted in a portfolio reallocation of some players especially smaller companies away from deepwater. Larger companies have struggled in the resource plays and are more active in deepwater.
- The cost of global deepwater activities has rapidly increased since 2010 resulting in a portfolio reallocation away from deepwater for some players, particularly smaller companies.
- The scale of the Macondo spill was greater than expectations and many players "stood on the sidelines" until improved containment systems could be developed and deployed.
- New deepwater regulations (e.g. operational and financial) have resulted in changing of market participants.

Without a consideration of these contemporaneous factors, Dr. Sunding's conclusion that leasehold ownership changes are solely due to the threat of CWA penalties on NOPs at Macondo cannot be supported.

2.2 Empirical trends in deepwater activity

Immediately following the Macondo incident, deepwater activity in the Gulf of Mexico drastically declined because of the moratorium; however, with the new regulatory system in place and with the development of new containment technology Gulf of Mexico deepwater activity has dramatically recovered. This surge in activity was the feature

article in the 2014 May issue of the Journal of Petroleum Technology.⁵ A key parameter of deepwater activity is the number of active rigs. In the figure below, the number of “floater” rigs (semisubmersibles and drillships) are meant for deepwater while the number of “jackups” are meant for shallow waters. As can be seen in the figure, deepwater activity has clearly accelerated and is now greater than before Macondo. The shallow water activity level has not materially changed. This contradicts Dr. Sunding’s conclusion that capital contributions for deepwater activities has decreased because of a threat of CWA penalties on NOPs.



Source: “Industry Flexes Muscles Again in Gulf of Mexico” JPT, May 2014

I conducted an analysis to gain insights on NOP participation by looking at the average ownership of current and future projects based on publically-available information.⁶ The greatest economic contribution is the result of development (when most of the capital is spent) and production (when most of the revenues are collected). I have thus focused my analysis on determining whether there are any changes in NOP behavior tied to development and production activities (in contrast to Dr. Sunding’s analysis of lease owner behavior, which is not closely tied to economic activity). My analysis shows that the average equity share of operators on projects with start dates of 2010 or earlier is 65% while the average equity share of operators on projects with start dates after the filing of the United States’ complaint of 2011 or later (i.e. includes projects under-construction

⁵ Parshall, J. “Industry Flexes Muscles Again in Gulf of Mexico,” Journal of Petroleum Technology, May 2014.

⁶ Credit Suisse. “US Gulf of Mexico” August 15, 2013 (US_PP_WAL000459-US_PP_WAL000495); Research Spreadsheet Prepared in Connection with Report (US_PP_WAL003615).

and in the planning stages) is 61%. For the operator's average share to decrease, as the trend shows here, the opposite has to be true for the NOP ownership share: it must have increased from 35% to 39%. Clearly, NOP participation is not falling as predicted by Dr. Sunding because of the chance of CWA penalties being imposed on Anadarko.

The average equity share of all owners per project also reveals insight into the behavior of industry market participants. The average share of all owners for project start dates of 2010 or earlier was 45% while for projects with start dates after 2011 (i.e. includes projects under-construction and in the planning stages) is 38%. This indicates that the number of NOPs for the newer projects has gone up. Finally, the average ownership share (all owners, both operating and non-operating) of projects currently producing is 45%. This decreases to 42% for projects under-construction and 33% for projects in the planning stages. Again, these falling average percentages occur because there are more NOPs in the newer, post-Macondo projects, which is exactly the opposite of what Dr. Sunding has predicted.

2.3 Operator and NOP financial and operational relationship

Dr. Sunding states that his conclusion that Anadarko should not be penalized as a “*non-operating investor*” is based (in part) on his “*review of operator and non-operator financial and operational relationships in offshore oil and gas exploration and production.*”⁷ However, it is apparent that Dr. Sunding's understanding of the NOPs' role and NOPs' relationships with operators does not conform to the actual roles and relationships in practice. Since Dr. Sunding does not cite the references he used in his review of the operator and non-operator relationship, I am unable to determine whether Dr. Sunding's misinterpretation of these relationships is due to the sources he used or whether it is due to his limited E&P experience.

Dr. Sunding only uses the term “non-operating investor” when referring to NOPs. This is a clear indication that he is unfamiliar with NOPs and the relationship between NOPs and operators. In fact, my search of the industry's technical paper database (www.onepetro.org) returns no entries for this term, and even Anadarko's other expert, Mr. Arnold, declines to use that term.

As discussed in my first paper, it is industry best practice for NOPs to be actively engaged in deepwater activities. As discussed below in Sections 3 and 4, NOPs can contribute to a broad range of decisions (both design and operational) that impact HSE performance because they have the information and capacity to do so. It is clear from my experience, and the industry literature cited in my first report and below, that NOPs are not passive investors; rather, NOPs are co-owners with significant rights and responsibilities. Yet Dr. Sunding repeatedly assumes NOPs are passive investors and that a large information asymmetry exists between operators and NOPs. None of these

⁷ Sunding Report at 2.

assumptions of Dr. Sunding's about NOPs are correct. This incorrect view invalidates many of his conclusions, particularly those of "efficient deterrence."

Dr. Sunding states "*The literature shows that penalizing a non-culpable, nonoperating investor does not result in rational or efficient deterrence, and could be counterproductive.*"⁸ The references Dr. Sunding cites to support his conclusions do not consider parties similar to relationship of Operators and NOPs and as such his use of these references is not appropriate.

For example, in Section D.2, Dr. Sunding states, "*The standard model of moral hazard shows that, when both investor and operator are well capitalized (i.e. when the operator is not judgment-proof), there is no social gain from assigning liability to the investor.*" However, the reference he cites to support this assertion⁹ is not actually about "*assigning liability to the investor.*" Rather, the intent of this paper is to examine how regulation and competitive forces can lead an economic "agent" to focus on cost minimization to such an extent that HSE risks are increased. It examines the specific case of the regulation of a natural monopoly and extends the conclusions to the more general principal-agent relationship.¹⁰ This relationship is not analogous to Operator/NOPs relationship as I discussed in my first report and expand on in Section 4 below.

Dr. Sunding's appeal to the literature of "moral hazards" is also flawed as it is based on the assumption of significant asymmetric information. Dr. Sunding's view that this asymmetry exists between operators and NOPs is exaggerated and is in fact another example where he has misrepresented the operator / NOPs relationships in practice. I discuss below in Section 4 that NOPs have access to significant information in deepwater activities due to the information requirements of the joint operating agreement (JOA) and through their roles on project teams and by other means, such as through communications with the operator. Additionally, in my first report I itemized a number of key reasons (e.g., "strategic learning") why NOPs have access to key HSE information. Dr. Sunding's theoretical considerations of moral hazards are not applicable here because they assume a significant lack of information by the NOP that does not exist.

In section D.3, Dr. Sunding claims, "*Extending civil penalties to investors can increase the frequency of oil spills.*" The paper by Pitchford that he cites in support of his opinion is titled "How Liable Should the Lender Be? The Case of Judgment-Proof Firms and Environmental Risks." This paper considers "*a potentially judgment-proof firm [could be bankrupted in the case of environmental incident], a lender, and a potential victim.*"¹¹

⁸ Sunding Report at 6.

⁹ Laffont, J. J. 1995. "Regulation, Moral Hazard and Insurance of Environmental Risks." *Journal of Public Economics* 58, pp. 319-336. (DEFEXP022922).

¹⁰ The example cited in the paper of a principal-agent relationship is a patient-doctor relationship.

¹¹ Pitchford, R., 1995, "How Liable Should the Lender Be? The Case of Judgment-Proof Firms and Environmental Risks," *American Economic Review* 85 (DEFEXP023128).

The paper concludes that extending liability to the lender could decrease safety. Without regards to the merits of the economic analysis, I can conclude that Dr. Sunding has incorrectly drawn an analogy between NOPs and a lender. NOPs have a very different role than a lender. As I discussed in my initial report and below in Section 4, NOPs are actively engaged in many deepwater activities and have a different level of information than a lender.

Dr. Sunding, building on this flawed analogy, cites Pitchford to argue: (1) non-operators will demand a higher rate of return to compensate for an increased risk of penalties (like a bank would charge); (2) this will result in a lower rate of return for the operator; and (3) the operator may cut corners on safety to increase its return.

This reasoning exposes Dr. Sunding's flawed analogy between an NOP and a "lender." It is true that as a lender increases the interest rate it charges (to cover greater risk in this case) the return to the owners (not just the operator) will be reduced. However, this zero-sum-game is not how the contractual relationship between operators and NOPs works in the real E&P world. The governing Model Form JOAs make it clear that operators and NOPs share the same upsides and downsides. The only way for the NOPs to get a higher return is if the operator earns a higher return. Dr. Sunding's incorrect understanding of the operator and NOP relationship has led him to the wrong conclusion that CWA penalties on a NOP will reduce HSE performance.

2.4 Summary of Dr. Sunding's report

Dr. Sunding's attempt to suggest imposing CWA penalties on Anadarko would not create an efficient, an absolute or an efficient deterrent are fatally flawed by incorrect assumptions about the roles of NOPs. Dr. Sunding's analysis of the impact on NOP decision making, and by extension over-all deepwater activity, is likewise critically flawed because he did not consider a number of key industry factors. An examination of NOP actions that are closely tied to economic activity (exploration, development and production) shows that deepwater activity has accelerated and NOPs' share has increased, which disproves Dr. Sunding's opinion. As a result, Dr. Sunding's conclusion that imposing material CWA penalties is not in the public's interest cannot be supported.

3 Response to Expert Report of Kenneth E. Arnold

Mr. Arnold contends in his expert report that "*the key to offshore safety is for operations to be performed within a culture of safety.*"¹² Further, he contends "*only the Operator can establish and maintain that culture*" because non-operators "*lack the information and*

¹² Arnold Report at 2.

capacity to control or influence operational decisions.”¹³ Based on these assumptions, Mr. Arnold concludes that it is not in the public interest to hold a non-operator accountable for offshore safety.

I contend that Mr. Arnold’s assumptions are based on too narrow a perspective of offshore safety. As a result of his flawed assumptions, Mr. Arnold’s conclusion is likewise unsupported. As I stated in my first report and expanded upon here, I contend that imposing material CWA penalties on Anadarko (in addition to CWA penalties on the operator) will incentivize behaviors by Non-Operating Parties (“NOPs”)¹⁴ that will improve offshore safety, while not imposing such material penalties (but imposing penalties on the operator) will incentivize NOP behaviors that will reduce the HSE performance of deepwater activities. Thus, it is my opinion that imposing material CWA penalties on Anadarko is in the public interest.

In this section I present my opinions that:

- Offshore safety depends on factors other than just “culture” and NOPs pursuing industry best practice can contribute to all of these factors (including culture) and thus improve offshore safety. (Section 3.1)
- Offshore safety goes significantly beyond “operations” and NOPs can and do positively impact these other areas in addition to contributing to operational issues (Section 3.2)

3.1 Factors that impact safety in oil and gas exploration and production

Mr. Arnold contends in his expert report that “*the key to offshore safety is for operations to be performed within a culture of safety.*”¹⁵ I agree that a culture of safety is critical to offshore safety; however, in contrast to Mr. Arnold, it is my opinion that NOPs can and do play a role in contributing that culture. In addition, Mr. Arnold’s focus on culture is incomplete. Safety culture is but one of several key human factors that are needed to

¹³ Arnold Report at 2.

¹⁴ As recognized by Mr. Arnold, different terms for the non-operating working interest participating parties have been introduced in this case that do not conform to industry norms (e.g. non-operating investor) to demonstrate the passive behaviors of some parties. In this report, I will use the common term “non-operating parties” (“NOPs”) to distinguish between non-operating interest owners that are participating parties to certain activities from those that are not. In my experience, this term is common as are others like “non-operators,” “partners,” and Mr. Arnold’s choice of “non-operating working interest owners.”

¹⁵ Arnold Report at 3.

ensure offshore safety according to the Society of Petroleum Engineers (“SPE”) technical report, “The Human Factor: Process Safety and Culture” (“2014 SPE Safety Report”).¹⁶

Mr. Arnold was a member of the steering committee that generated this important post-Macondo SPE report that identifies the following ten key factors as contributing to safety in oil and gas exploration and production activities:

1. Leadership and Culture
2. Perception of Risk and Decision-Making
3. Communication of Risk
4. Human Factors in Design
5. Individual and Team Capacity
6. Collaborative and Distributed Team (i.e. teams working in geographical dispersed locations) Working
7. Commercial and Contractual Environment
8. Workload Transition
9. Assurance of Safety-Critical Human Activities
10. Investigation and Learning from Incidents

The order of the list of human factors above does not imply significance; however, the report identified three factors as those that organizations should prioritize because these three factors create a “*base*” that is required for progress on the others to be achieved. These three factors are:

1. Leadership and Culture
2. Perception of Risk and Decision-Making
3. Individual and Team Capacity

The examination of each of these factors below demonstrates that NOPs can and do contribute to offshore safety.

3.1.1 Non-operators’ role in safety leadership and culture

Mr. Arnold identifies the safety culture of an “*organization*” as critical to offshore safety. Further, he states that “*The safety culture of an organization is the product of individual and group values, attitudes, competencies, and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organization’s health and safety programmes*” and “*Safety in operations depends on the staff at every level knowing that*

¹⁶ SPE Technical Report. “The Human Factor: Process Safety and Culture,” SPE 170575, March 2014 (US_PP_WAL002467).

their superiors really believe and act with these shared values.” Mr. Arnold then concludes that NOPs cannot help “develop” and “sustain” a safety culture.¹⁷

While I agree with some of Mr. Arnold’s characterizations above (but not Mr. Arnold’s conclusions about NOPs), I believe it critical to understand these general observations within the specific considerations of deepwater activities since this perspective reveals the important role that NOPs can play, through active-participation, in safety leadership and culture.

NOPs can contribute to and help lead and maintain the safety culture. For example, the 2014 SPE Safety Report discussed above mentions the importance of site visits by “leaders” to demonstrate safety leadership:

Leaders can be trained in what behaviors during site visits have the most impact on process safety. Before making visits and inspections, leaders can be prepared on what to look for, what to ask for, and how to understand what the answers mean. While such approaches can never be technically fool proof, and executives and other managers can be misled, it is the activity itself that is most critical. Such activities send a clear message about what the leader finds important enough to ask about.¹⁸

The industry literature demonstrates that such leadership is not confined to the Operators. For example, a publication by OMV (an integrated international oil and gas company) notes that NOPs can play an important role in promoting HSE safety culture through site visits.¹⁹ It stated that in addition to performing audits and review, NOPs can contribute by conducting field visits. Such visits, which can be conducted with or without partners, can reinforce a message that HSE is important and also shows a serious commitment to HSE because senior leadership is involved. Moreover, according to OMV, NOPs should not hesitate to be proactive with the operator when they perceive issues such as safety or quality control. The article cites an example where the operator was struggling with service quality and HSE issues. The non-operator’s (OMV’s) senior management asked to visit the operator’s offshore facilities both to demonstrate their concern about the issues and to listen to understand the situation. The visit resulted in finding both technical and cultural shortcomings which were communicated back to the operator who immediately put an action plan into place.²⁰

¹⁷ Arnold Report at 3.

¹⁸ SPE 2014 Safety Report, at 9-10.

¹⁹ Lawrie, Graeme. “The Role of a Non-Operating Partner in Contributing to HSE Excellence.” SPE 155941, SPE/APPEA International Conference on Health, Safety and Environment in Oil and Gas Exploration and Production. September 2012 (“Lawrie 2012”) (US_PP_WAL002336-US_PP_WAL002348).

²⁰ Lawrie 2012, at 6-7.

Another instance noted by OMV where the NOPs demonstrated HSE safety culture leadership in collaboration with the operator through a site visit involved a visit to a construction yard of a manufacturer of equipment for the project. The operator arranged the visit with its four NOPs, and pointed out that each of the NOPs were major oil and gas companies who also might be future customers for the manufacturer's vessels. The visit highlighted the importance of HSE to the construction company, concluding that the coordinated visit *"was an excellent opportunity for operator and NOPs to pass a strong consistent message that HSE must come before on-time delivery."*²¹

Leadership extends beyond site visits. Project Managers routinely leverage NOPs on leadership efforts. The example of the Typhoon Project in deepwater Gulf of Mexico where Chevron was operator and BHP Billiton was the NOP is instructive. For that project, managers from Chevron (as operator), BHP Billiton (as NOP), and the contractors formed a safety leadership team to promote a culture of safety to achieve incident and injury-free performance across the multiple companies, interfaces, and scope of involvement.²² The team's purpose was to impact workers through:

- *Owning and communicating the project's Environmental and Safety objectives;*
- *Building genuine, harmonious relationships between all organizations and individuals;*
- *Creating a culture of acknowledgement and recognition for Environmental and Safety efforts and accomplishments;*
- *Sharing information, lessons learned, etc.;*
- *Keeping a finger on the pulse of the project; and*
- *Working issues and interfaces*

Although Macondo was an exploration well, it is important to note that the vast majority of activity (e.g. drilling) actually occurs during the development stage.²³ Deepwater activities during development are managed by Integrated Project Teams ("IPTs") that are comprised of operating and NOP personnel. The Model Form JOA used by most market participants in the USA grants NOPs a representation on the IPTs equal to their equity share.²⁴ Since the average equity share of operators for projects under-construction or in

²¹ Lawrie 2012, at 7.

²² Visser, Robert C., Joseph D. Williams and Bob Aquadro. "Typhoon Offshore Safe and Clean: Authentic Leadership to Produce an Incident and Injury-Free Environment." OTC 14127, 2002 Offshore Technology Conference. May 2002 (US_PP_WAL001809-US_PP_WAL001815).

²³ It is typical to segment the lifecycle of a deepwater project into four stages; namely, exploration, delineation, development and production.

²⁴ Strictly speaking the Model Form JOA discriminates a "Feasibility" team and a "Project Team." The "Project Team" manages the Selection, Define and Execution stages. IPT representation is addressed for the Project Team within the JOA (Appendix G) (US_PP_WAL003631-US_PP_WAL003647).

the planning stages is currently less than 60%²⁵, this means that almost 40% of the people on IPTs could be NOPs' staff. The Operator has a strong influence on the safety culture of the IPT because the operator has the right to choose the Project Manager (to whom the IPT reports) and the leadership of the Project Manager is critical to establishing the safety culture of the IPT; however, the safety culture of the IPT is also strongly influenced by the NOPs and contractors.

A final example of safety culture and leadership noted in the 2014 SPE Safety Report is the role of safety assurance. This is an area where NOPs have clear roles and responsibilities. For example, Exhibit K to the Model Form JOA used most commonly in the USA provides NOPs the right to audit and inspect the operator's Safety Management Systems.²⁶ In addition, while Mr. Arnold states, "*I am not aware of any report that even suggests that NO-WIOs can be or should be responsible for offshore safety,*" examples of such are noted in the industry literature.²⁷ Specifically, Norway and the UK (see Section 5.4.2.1 and Section 5.4.2.2 in my August 15, 2014 Expert Report) both have specific regulations regarding NOPs' responsibilities regarding E&P HSE assurance. This is common knowledge in the industry.²⁸

Safety culture is critical to E&P safety as Mr. Arnold correctly notes; however, as demonstrated above Mr. Arnold's contention that NOPs have no role in developing and sustaining that culture is not consistent with industry practice.

3.1.2 Non-operators' role in improving perception of risk and decision-making

The second priority identified in the 2014 SPE Safety Report is the importance of decision processes, especially decisions processes where HSE risks are explicitly addressed. The decision process is defined in the Report as "*the entire process from awareness of a situation (perceiving a potential hazard or failing to do so), making projections of what might happen, planning possible courses of action, and choosing what to do.*"²⁹

The majority of my consulting practice has been, and continues to be, focused on improving the quality of decision processes, particularly those decisions made on large projects like deepwater projects. Decision Analysis, or Decision Engineering, is the field of study that provides much of the academic support to solutions to these challenges to

²⁵ Credit Suisse. "US Gulf of Mexico" August 15, 2013 (US_PP_WAL000459-US_PP_WAL000495).

²⁶ Exhibit K to 2007 810 Joint Operating Agreement (Deepwater) (US_PP_WAL001765-US_PP_WAL001767).

²⁷ Lawrie 2012, at 2.

²⁸ Lawrie 2012, at 2.

²⁹ 2014 SPE Safety Report, at 11.

quality decision making (e.g. assessments of risks and uncertainties, overcoming cognitive and motivational biases, consideration of appropriate ranges of options, logically correct reasoning and organizational alignment, etc.).³⁰ NOPs have the opportunity, and do if industry best practice is followed, to ensure decision-making challenges are successfully overcome.

As discussed above, a significant portion of deepwater activities are managed by IPTs. These IPTs use a “stage-gate project management process” that was explicitly developed to help improve decision quality.³¹ NOPs have great influence on IPTs because they will likely have significant representation on the IPT. Additionally, the “stage-gates” in this process are explicitly meant to provide the Operators and NOPs an opportunity to assess decision quality.

The key role of assurance in improving the perception of risk and decision making was identified in the 2014 SPE Safety Report. It found that the decision challenges must be addressed at various levels, and that methods to assure proper decision-making include documentation, procedures, “management of change,” and internal audits, as well as “lessons learned”:

It is important that lessons learned relate to the decision-making process rather than only the outcome of the decision. The “health status” can be assessed through regular meetings, facilitated focus groups, perception surveys and management reviews with corrective actions. Safety management systems and their assurance measures need to be tailored to the maturity of the organization.³²

NOPs have the ability to participate in all of these assurance steps. Decision documentation is routinely available to NOPs. The increasing role of NOPs with regard to management of change is included in changes to the Model Form JOA as summarized in my original report (see Section 5.2). The “health status” and “safety management systems” are all part of NOPs’ active-participation. The role of NOPs in “audits” is important and clearly demonstrates that NOPs can be actively engaged, even though some coordination may be required if there are multiple partners.³³

³⁰ Bratvold, R.B. and Begg, S., “Making Good Decisions,” 2010 Society of Petroleum Engineers (US_PP_WAL000098-US_PP_WAL000312).

³¹ Walkup, Gardner and J. Robert Ligon. “The Good, the Bad, and the Ugly of the Stage-Gate Project Management Process in the Oil and Gas Industry.” SPE 102926 2006 SPE Annual Technical Conference and Exhibition. September 2006 (US_PP_WAL002234-US_PP_WAL002245).

³² 2014 SPE Safety Report, at 13.

³³ Lawrie 2012.

3.1.3 Non-operators' role in building HSE capacity

The 2014 SPE Safety Report identifies a number of challenges to building and assuring individual and team capacity for HSE and concludes that improvements cannot be fully addressed by a single company. Rather, *“because of the extensive use of contractor services and partnerships, there is critical industry-wide component to properly addressing this challenge”* to safety capacity issues.³⁴

The role of NOPS in reviewing operators' HSE capabilities, processes and performance has increased since the events at Macondo. For example, Chevron has developed and deployed an “operational excellence” process to not only audit its operators' HSE capabilities and performance but to collaboratively and proactively manage risks as NOPS.³⁵ Chevron acknowledged that it was *“just as important to understand the [HSE] risks and capabilities of [non-operated joint ventures]³⁶ as those of its owned and operated assets.”³⁷*

To understand the safety risks and capacities when acting as a non-operator, Chevron established a team within its HSE organization. This team was tasked with developing a process to create, together with Chevron's partners, a joint understanding of safety strengths and risks through shared learning and best practices. Chevron reports that operators have been *“extremely receptive to site visits and feedback,”* in part because the outcomes benefit both the operator and Chevron, and that the relationships facilitate *“partners”* learning from each other. In particular, the process established by Chevron has led to improved safety performance. Examples of activities completed as a result included: seconding employees to the non-operated project to assist with the implementation of risk-reducing processes; presentations from subject matter experts about risk-reducing processes; establishment of joint HSE safety committees; and increased site visits from non-operator management. Revisions have been made to management plans to include HSE priorities, where past plans focused on more on financial and operating criteria.³⁸

³⁴ SPE 2014 Safety Report, at 15.

³⁵ Chevron Operational Excellence Audit Group, “HES Assessments of Non-Operated Joint Ventures,” SPE 168575, SPE International Conference on Health, Safety and Environment, Long Beach, CA, 17-19 March 2014 (“Chevron HSE Report”) (US_PP_WAL002445-US_PP_WAL002456).

³⁶ Note: The term NOJV (non-operated joint venture) as used by Chevron includes more than formal “joint ventures” and includes NOPS as defined in the Model Form JOA used commonly in the Gulf of Mexico.

³⁷ Chevron HSE Report, at 1.

³⁸ Chevron HSE Report, at 3-9.

As with safety leadership/culture and perception of risk/decision-making, NOPS have an important role in building and assuring individual/team capacity with regards to E&P HSE.

3.1.4 Additional areas where non-operators can contribute to E&P safety

The remaining factors identified in the 2014 SPE Safety Report as key to safety in E&P are: Communication of Risk; Human Factors in Design; Collaborative and Distributed Team Working (across multiple locations); Commercial and Contractual Environment; Workload Transition; Assurance of Safety-Critical Human Activities; and Investigation and Learning from Incidents.

NOPs have contributions to make in all of these key areas. Design decisions were discussed in my original report and I further elaborate on these below in Section 4. The collaborative team working is highly impacted by the extensive use of IPTs used for deepwater activities and NOPS are key to IPTs as discussed above. The Model Form JOA used as the basis for most “contractual environments” memorializes the industry custom and best practice of active-participation of NOPS discussed in my first report. Since no one company has all the “learnings from incidents,” the inclusion of NOPS to contribute to this factor is critical.

3.2 Offshore safety goes beyond “operations”

Mr. Arnold contends that “*the key to offshore safety is for operations to be performed within a culture of safety.*”³⁹ In fact, there are a number of instances in his report where Mr. Arnold ties “offshore safety” to “operations.” I agree that operations are important to offshore safety; however, as discussed in detail in the 2014 SPE Safety Report, “operations,” particularly operational decisions, are only part of offshore safety. This is important because the role of NOPS, as discussed in my first report (see Section 5.2) and below in Section 4, is more extensive in non-operational activities such as well design that are nonetheless critical to “offshore safety.”

The 2014 SPE Safety Report is clear on the distinction between operations and other non-operational activities, and equally clear E&P process safety depends on more than operations. The Report concludes that interference with human performance under real-time pressures “*extend[s] beyond the immediate operational situation,*” and includes the role of management, degree of “*back-office*” support, technology, and other activities or arrangements that “*may date months or years before operations began but still have a direct bearing on front-line operations.*”⁴⁰

³⁹ Arnold Report at 2.

⁴⁰ 2014 SPE Safety Report, at 3.

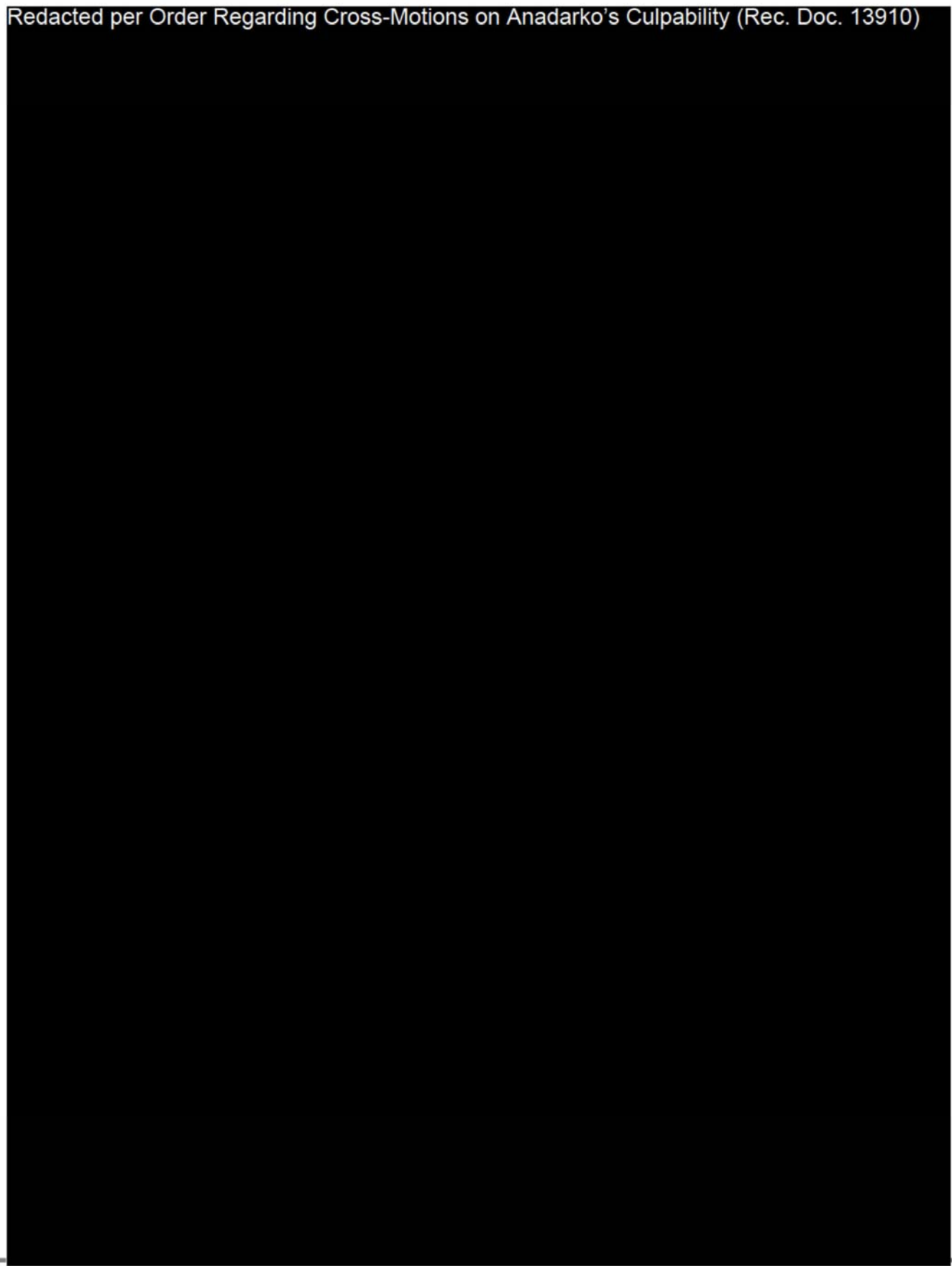
Finally, this important report identified that solely depending on those doing the actual operations (“*closer to the workplace*”) to ensure quality HSE decisions is not a best practice but rather, to the extent possible, operational decisions should be “*rule-based*” meaning determined *a priori* to actual operations during design:

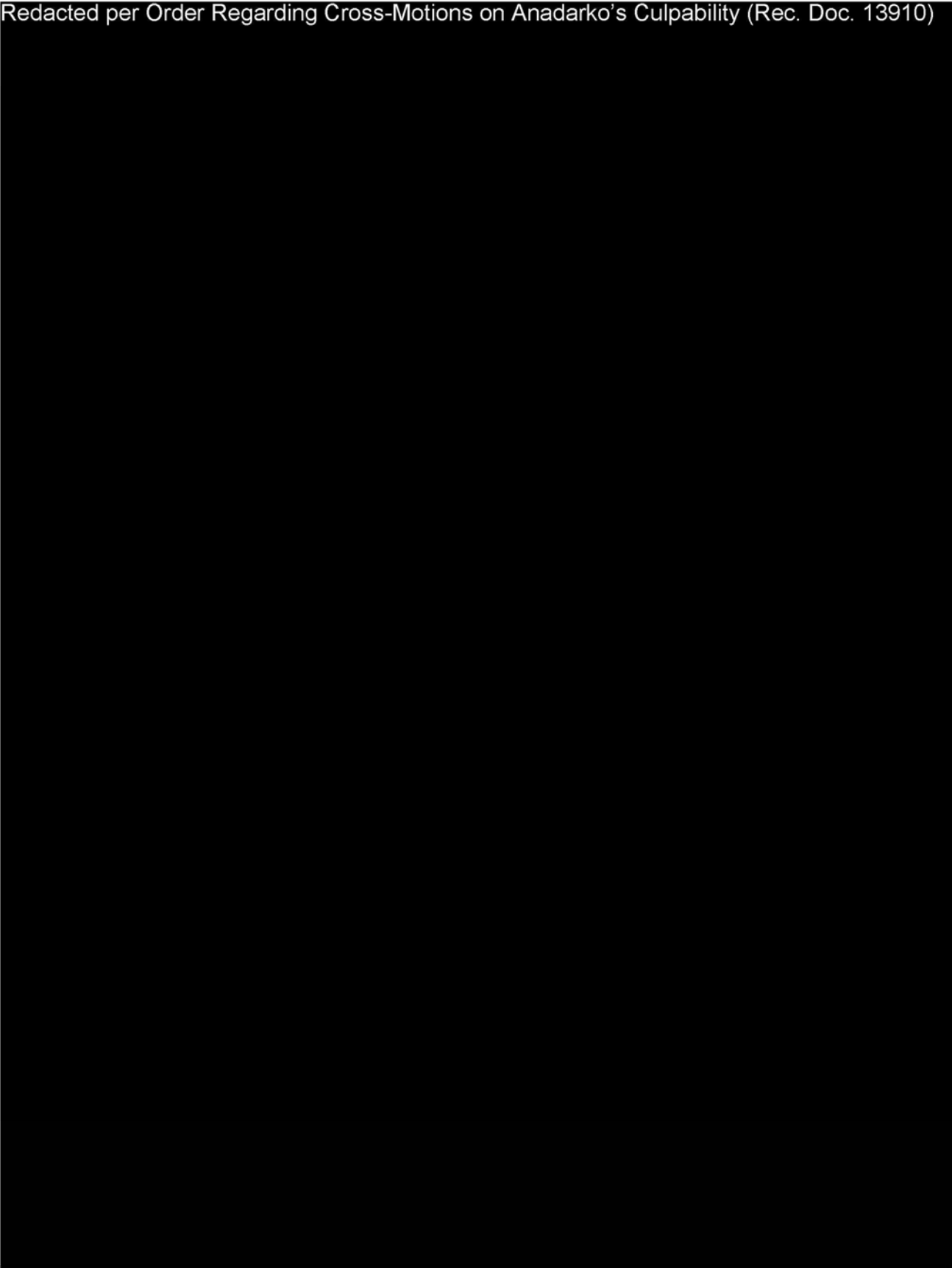
*One important aspect of Operational Control of Work centers on the role of risk assessment. Experience has shown that those closest to the action become biased in favor of achieving the goal and downplay risks. The closer to the workplace, the more decision-making should be rule-based rather than risk-based.*⁴¹

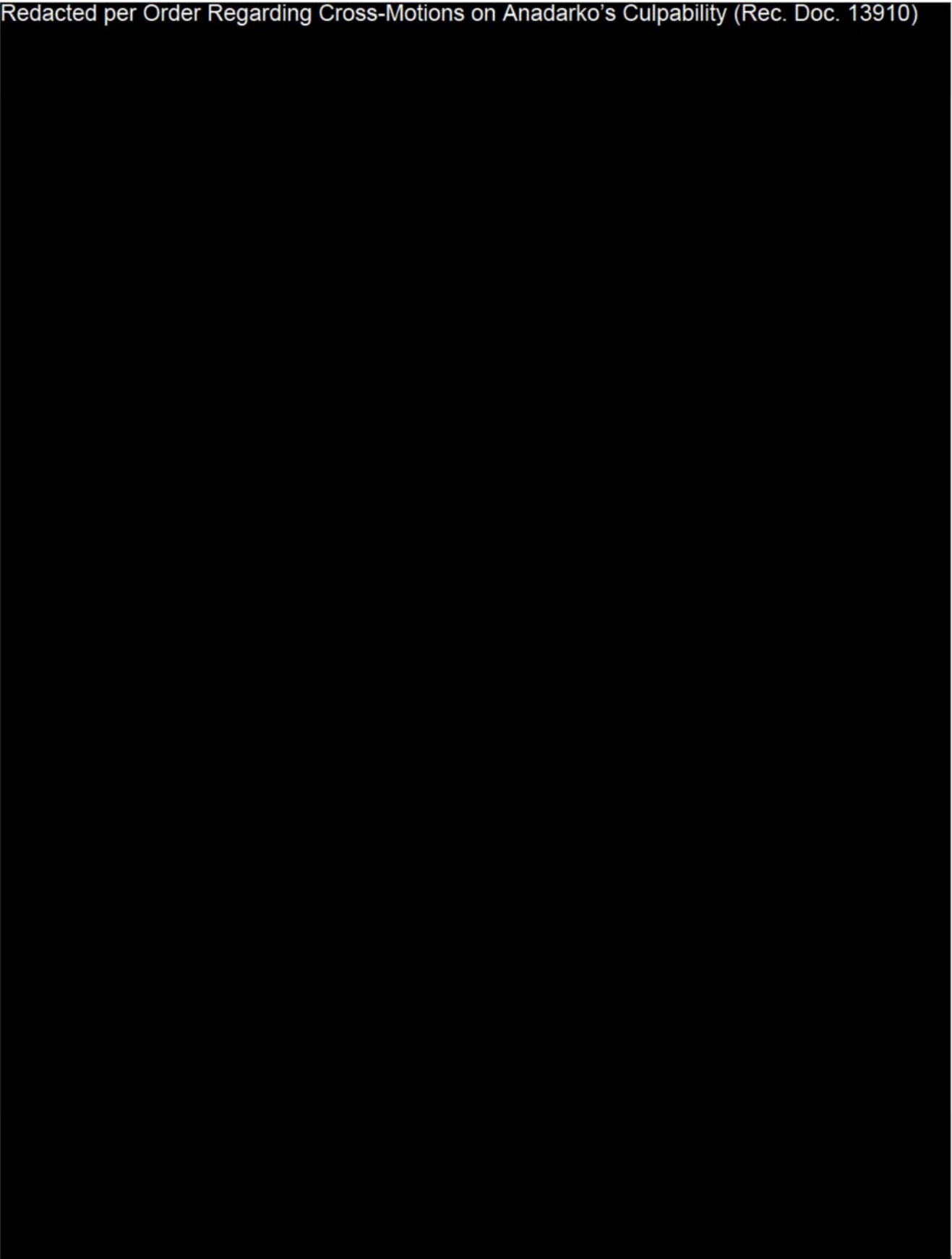
This “rule-based” approach where key decision are actually removed from those conducting the operations in real time is in direct conflict with Mr. Arnolds’ contention that “*Operational safety requires a culture in which the people who actually do the work always make the right choices.*”⁴²

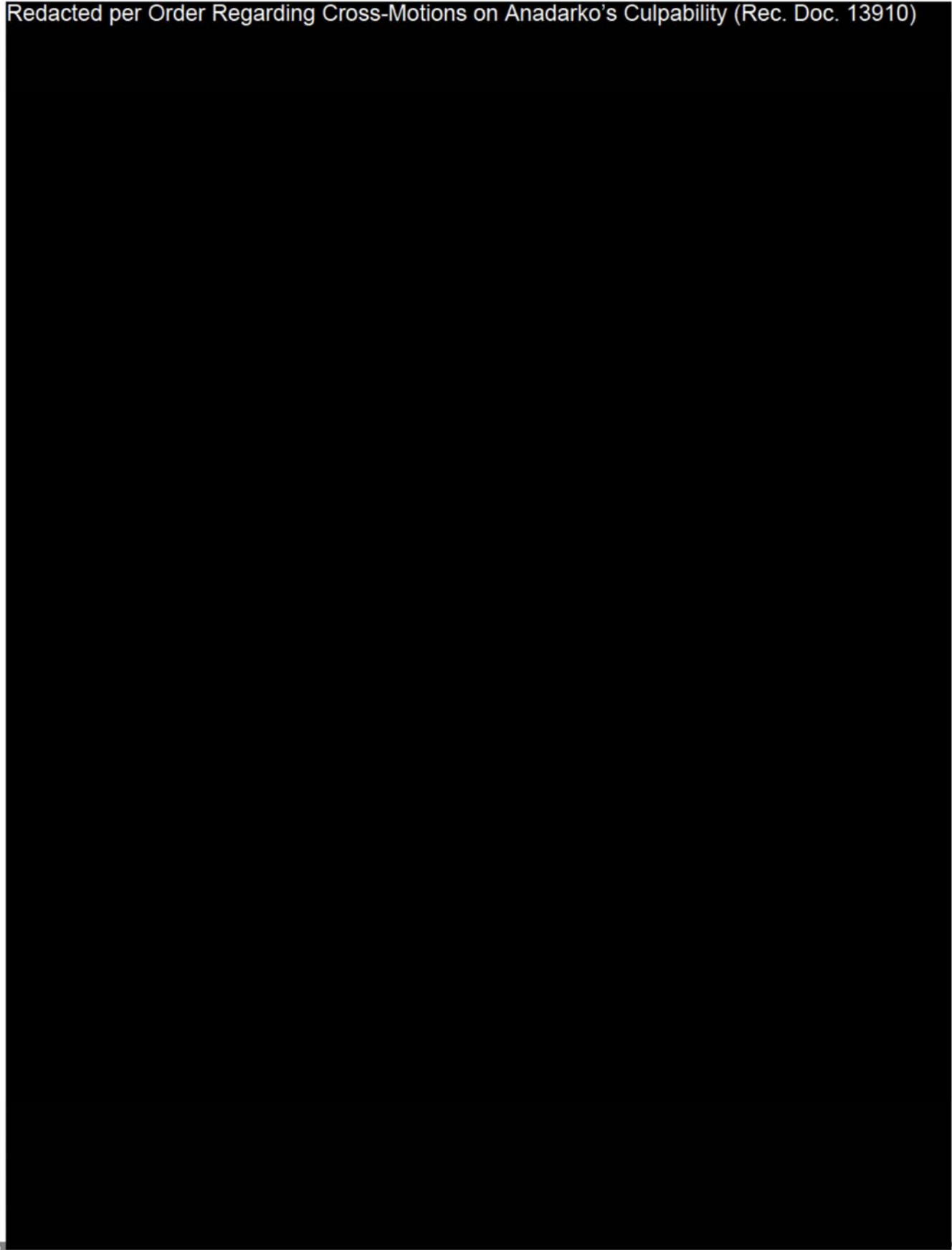
As I have discussed in my first report (Section 5.2), and expand on in Section 4 below, NOPs play a critical role during design (e.g. cement design, temporary abandonment design) to assure HSE quality and thus NOPs can impact operational performance if the “rule based” best practice is pursued.

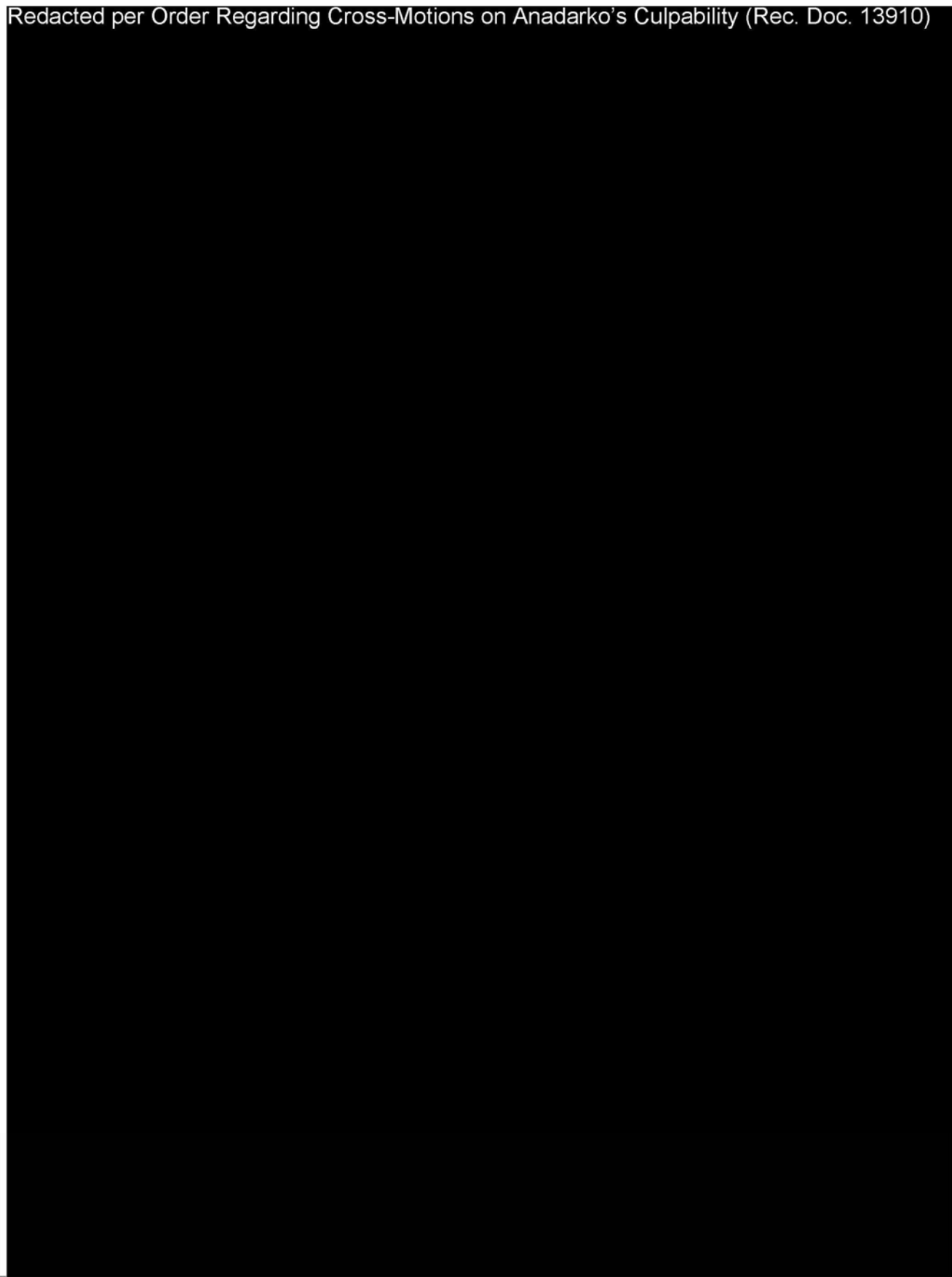
Redacted per Order Regarding Cross-Motions on Anadarko’s Culpability (Rec. Doc. 13910)

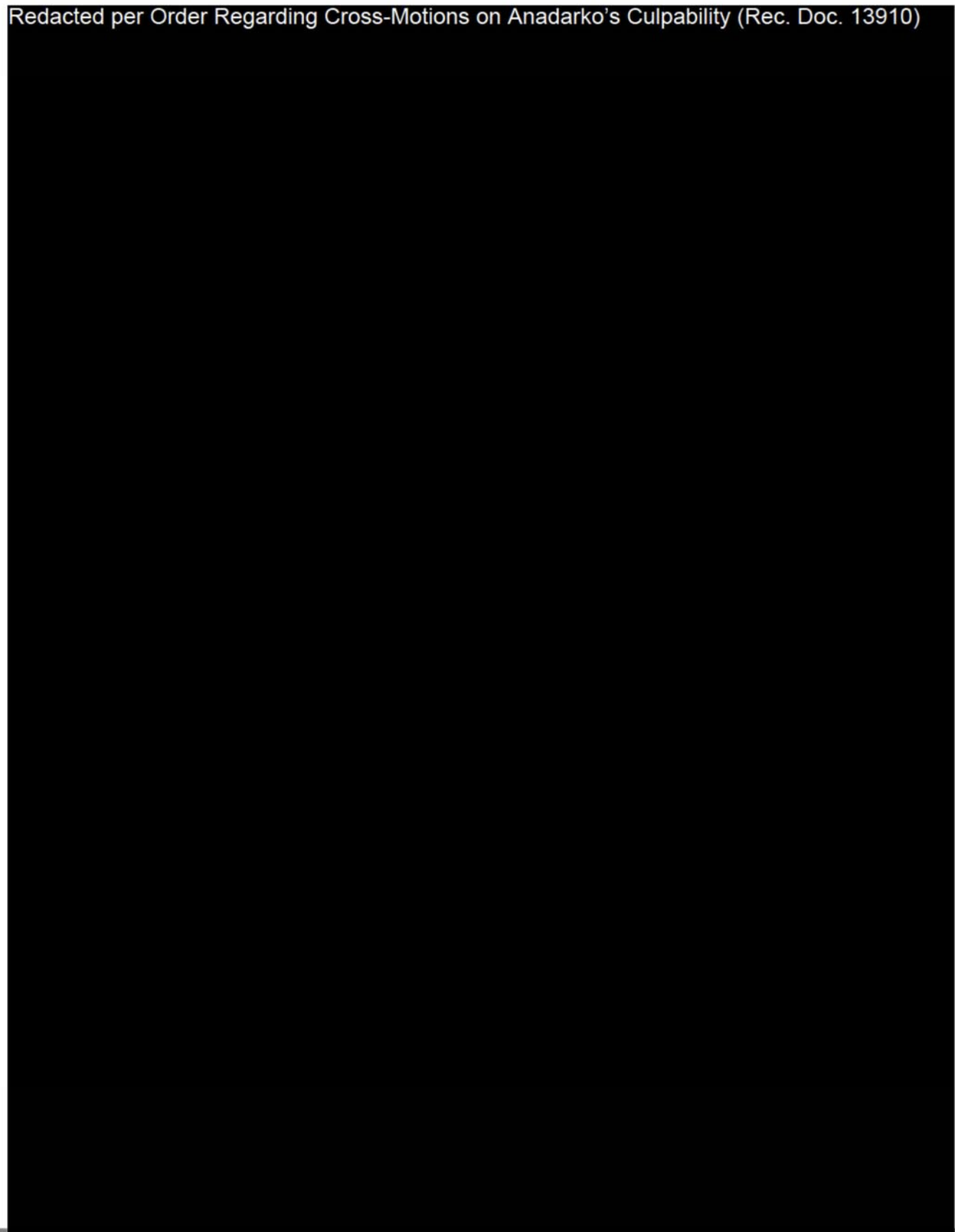


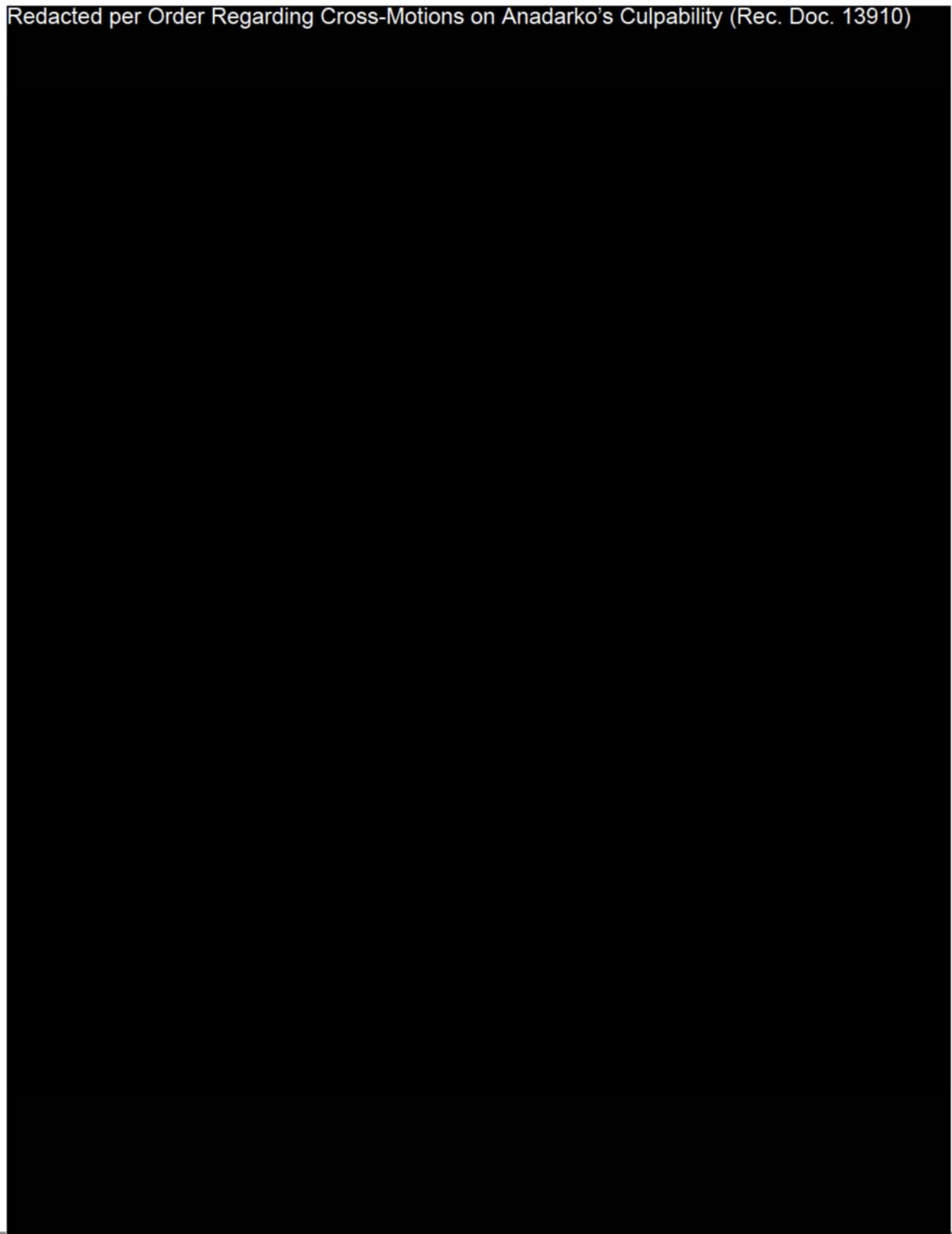












Appendix A – Considered Materials

In addition to the documents cited in the Round 1 and Round 2 expert reports, as well as the consideration materials identified in conjunction with the Round 1 expert report, the following documents were considered in preparation of this Round 2 report:

Bates, Exhibit, TREX, or Other Description
APC-SHS2A-000001166-APC-SHS2A-000001166
ANA-MDL-000007258-ANA-MDL-000007261
ANA-MDL-000021803-ANA-MDL-000021815
ANA-MDL-000111525-ANA-MDL-000111533
DEFEXP000452-DEFEXP000536
DEFEXP000800-DEFEXP000869
DEFEXP000870-DEFEXP000896
DEFEXP000897-DEFEXP000924
DEFEXP001010-DEFEXP001024
DEFEXP001025-DEFEXP001077
DEFEXP001078-DEFEXP001117
DEFEXP001118-DEFEXP001212
DEFEXP001213-DEFEXP001262
DEFEXP001263-DEFEXP001279
DEFEXP001280-DEFEXP001302
DEFEXP001303-DEFEXP001320
DEFEXP001340-DEFEXP001353
DEFEXP001410-DEFEXP001429
DEFEXP001430-DEFEXP001460
DEFEXP012004-DEFEXP012022
DEFEXP012023-DEFEXP012040
DEFEXP012544-DEFEXP012562
DEFEXP012596-DEFEXP012628
DEFEXP023040-DEFEXP023047
DEFEXP023128-DEFEXP023135
Expert Report of Kenneth E. Arnold (dated August 15, 2014)
Report of Professor David L. Sunding (dated August 15, 2014)
Expert Report of Charles F. Mason (dated August 15, 2014)
US_PP_MAS011666-US_PP_MAS011818
US_PP_WAL003609-US_PP_WAL003614
US_PP_WAL003615-US_PP_WAL003615
US_PP_WAL003616-US_PP_WAL003630
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