

UNITED STATES OF AMERICA
DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

IN THE MATTER OF)
) FE DOCKET NO. 10-111-LNG
Sabine Pass Liquefaction, LLC)
and Sabine Pass LNG, L.P.)

SIERRA CLUB'S MOTION TO INTERVENE OUT OF TIME, PROTEST, AND COMMENTS

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On May 20, 2011, the Department of Energy’s Office of Fossil Energy (“DOE/FE”) conditionally granted Sabine Pass Liquefaction, LLC and Sabine Pass LNG, L.P. (collectively “Sabine Pass”) long-term authorization to export liquefied natural gas (“LNG”) to non-free trade agreement nations. DOE/FE Order No. 2961. This order tentatively found that export of LNG would be “consistent with the public interest” pursuant to 15 U.S.C. § 717b(a). DOE/FE explained that this authorization was conditional because DOE/FE had not completed the review of environmental impacts required by the National Environmental Policy Act (“NEPA”), 42 U.S.C. § 4331 *et seq.* See DOE/FE Order No. 2961 at 41, 43. DOE/FE stated its intention to rely on the Federal Energy Regulatory Commission (“FERC”) to play the lead role in the NEPA process, and that DOE/FE would not finalize the authorization until this process was complete. *Id.*

Both Natural Gas Act’s public interest standard and NEPA require analysis of upstream effects of LNG export, including inducement of additional shale gas drilling. Domestic natural gas production, including shale gas extraction, directly affects many thousands of Sierra Club members. Because FERC refused to consider these upstream effects in its NEPA review, the Sierra Club moves to intervene out of time to assert DOE/FE’s independent obligation to consider these effects. Based on the available information, Sierra Club protests Sabine Pass’s application as contrary to the public interest.

I. Sierra Club Should be Granted Intervention

In accordance with DOE regulations, Sierra Club hereby identifies the “rights and interests” it seeks to assert in this proceeding and demonstrates that intervention out of time is warranted, because intervention will not negatively impact the proceeding and good cause exists for late intervention. 10 C.F.R. § 590.303(b) and (d).

A. Sierra Club's Rights and Interests

Sierra Club is concerned with this application because the organization's members live and work throughout the area that will be affected by the Sabine Pass export proposal, including in the regions adjacent to the Sabine Pass facility and in regions near the pipelines and gas fields necessary to supply the plant. As of April 2012, Sierra Club had 2,899 members in Louisiana, 22,412 members in Texas, and 608,095 members in all. Declaration of Yolanda Andersen at ¶ 7.¹ Many of these members will be directly affected by the export project. Members living in and around drilling sites in the nation's shale plays will see drilling activity continue and intensify because of the export project. Gas production has caused serious air pollution, threatens water resources, brings major industrial activity to previously rural sites, fragments formerly intact forests and fields, and has caused loud noises, foul odors, and crushing traffic on small roads, as discussed below. Members living near the export and liquefaction facility itself will have to contend with the pollution and nuisance caused by export operations. And members throughout the country will be burdened by higher gas prices and increased climate change caused by the project.

Accordingly, the Sierra Club asserts interests in ensuring that DOE/FE interprets and applies the Natural Gas Act's public interest analysis to include consideration of environmental and other "upstream" effects, and Sierra Club is relatedly interested in ensuring that the NEPA analysis encompasses these effects. These interests include:

- The environmental and economic consequences of any expansion or change in natural gas production, especially in shale gas plays, as a result of increased gas exports, including damage to air, land, and water resources caused by the increasing development of these plays, and the public health risks caused by these harms.
- The economic impacts of any gas exports from the Sabine Pass facility, whether individually or in concert with exports from other such facilities, including the consequences of price changes upon industrial and electrical generating facilities who may switch from gas to coal fuels in response to gas price increases. Sierra Club, in particular, works to reduce U.S. and global dependence on fossil fuels, including coal, gas, and oil, and to promote clean energy and efficiency in order to protect public health and the environment. To the extent changes in gas prices increase the use and production of fossil fuels, Sierra Club's interests in this proceeding are directly implicated.
- The public disclosure, in NEPA and other documents, of all environmental, cultural, social, and economic consequences of Sabine Pass's proposal, and of all alternatives to that proposal.
- The environmental consequences of any construction and operation of export and related facilities, including emissions and other pollution associated with the gasification and liquefaction processes, environmental damage associated with pipeline, facility

¹ Attached as Exhibit 1.

construction and operation, environmental impacts caused by shipping traffic, and the emissions associated with all phases of the process from production to combustion.

Sierra Club has demonstrated the vitality of these interests in many ways. Sierra Club runs national advocacy and organizing campaigns dedicated to reducing American dependence on fossil fuels, including natural gas, and to protecting public health. These campaigns, including its Beyond Coal and Natural Gas Reform campaigns, are dedicated towards promoting a swift transition away from fossil fuels and to reducing the impacts of any remaining natural gas extraction.

B. Sierra Club Has Good Cause for Intervention Out of Time and Intervention Will Not Unduly Disrupt The Proceeding

Sierra Club's interests, and the circumstances of this case, amply justify intervention here, even though this proceeding has been going on for some time. DOE's regulations provide that intervention out of time will be granted "for good cause shown and after considering the impact of granting the late motion of the proceeding." 10 C.F.R. § 590.303(d). Although DOE/FE has provided little interpretation of these terms, Sierra Club satisfies the analogous aspects of FERC rule 214(d)² and Federal Rules of Civil Procedure 24.³ In particular, FERC has adopted a general policy of allowing late intervention in natural gas proceedings so long as intervention is sought before a final order is issued. *See, e.g., Cameron LNG, LLC*, 118 FERC ¶ 61019 (Jan. 18, 2007).

There is no final order in this case and the issues which Sierra Club seeks to raise must be considered before DOE/FE may issue a final order. As we explain at length below, the Sabine Pass export license is not final because DOE/FE has not completed its environmental review of the project, under both the Natural Gas Act and NEPA. DOE /FE anticipated that FERC's NEPA process would consider the "potential environmental impacts of the requested export authorization under NEPA." DOE/FE Order 2961 at 40. Accordingly, and, crucially, "[a]s requested in the application" itself, DOE conditioned its export authorization "on the satisfactory completion of the environmental review process ... and on issuance by DOE/FE of a finding of no significant impact or a record of decision pursuant to NEPA." *Id.* at 41.

Thus, DOE has anticipated, from the beginning, that it would have to review FERC's work and make a separate finding on the environmental impacts of Sabine Pass's proposal before finalizing its order. That work could not be done until FERC completed its analysis, and must be done whether or not Sierra Club's intervention is granted. Thus, the phase of the proceeding

² 18 C.F.R. § 385.214(d).

³ Note that FRCP 24 does not establish an explicit deadline for intervention, so under that rule the inquiry is not whether to allow an "untimely" motion to intervene, but instead whether a delayed or late motion to intervene is nonetheless "timely."

which has now begun is the precise moment at which the environmental concerns which Sierra Club wishes to raise *should* be articulated, and Sierra Club's intervention will not disrupt DOE/FE's consideration of these issues. Instead, Sierra Club seeks to inform that process. DOE/FE should grant intervention.

Analogous case law from FERC and the federal courts strongly supports this outcome. FERC focuses, for instance, most strongly on the impact of late intervention on the proceedings. FERC's cases have typically held that untimely intervention will not cause prejudice if the intervention is sought prior to the final decision. *See, e.g., Cent. Hudson Gas & Elec. Corp.*, 41 FERC ¶ 61313 (Dec. 15, 1987). For example, FERC has granted a motion to intervene that "was over two and one-half years late" where FERC was still processing the underlying application, such that intervention would not disrupt the proceeding or cause prejudice to the applicant. *Jack M. Fuls Tumalo Irrigation Dist.*, 36 FERC ¶ 61136 (July 30, 1986). Cases interpreting Federal Rule of Civil Procedure 24 likewise establish that "[t]he most important consideration in deciding" a late motion to intervene "is whether the delay in moving for intervention will prejudice the existing parties to the case." § 1916 Timeliness of Motion, 7C Fed. Prac. & Proc. Civ. § 1916 (3d ed.) (summarizing cases). Similarly, where FERC has determined that late intervention will not delay, disrupt or otherwise prejudice the proceeding FERC has granted intervention. FERC has repeatedly gone so far as to find that the lack of prejudice itself demonstrated "good cause shown" without examining the reason for the delay in filing. *Superior Offshore Pipeline Co.*, 68 FERC ¶ 61089 (July 19, 1994), *E. Am. Energy Corp. Columbia Gas Transmission Corp.*, 68 FERC ¶ 61087 (July 19, 1994).⁴ Here, Sierra Club's intervention cannot prejudice any party, or delay the proceeding, because DOE/FE must consider the environmental questions in this protest. The conditional approval directs as much.

Case law shows that intervention should be granted in these circumstances, where Sierra Club's nominally out-of-time motion in fact comes at the logical moment in these proceedings. The impact or prejudice inquiry looks to impacts specifically attributable to the delay, rather than impacts associated with the moving party's participation in the suit overall. "For the purpose of determining whether an application for intervention is timely, the relevant issue is not how much prejudice would result from allowing intervention, but rather how much prejudice would result from the would-be intervenor's failure to request intervention as soon as he knew or should have known of his interest in the case." *Stallworth v. Monsanto Co.*, 558 F.2d 257, 267 (5th Cir. 1977) (interpreting Fed. R. Civ. P. 24), *see also AmerisourceBergen Corp. v. Dialysist West, Inc.*, 465 F.3d 946, 953 (9th Cir. 2006) (in determining whether to allow amendment of a complaint under Fed. R. Civ. P. 15, looking to prejudice specifically attributable to the delay in seeking amendment and excluding costs that would have been imposed had the amendment been filed earlier).

⁴ Where FERC has considered the reason for delay, FERC has held that even where the "excuse for untimely filing is flimsy at best," the absence of prejudice warranted allowing intervention. *Am. Ref-Fuel Co. of Hempstead*, 47 FERC ¶ 61161 (Apr. 28, 1989).

In FERC's natural gas proceedings, including the Sabine Pass FERC proceeding that parallels this docket, FERC has followed a policy of allowing late intervention during the NEPA review process. *Sabine Pass Liquefaction LLC*, 139 FERC ¶ 61,039 (Apr. 16, 2012) (granting Sierra Club's untimely motion to intervene), *Cameron LNG, LLC*, 118 FERC ¶ 61019 (Jan. 18, 2007) (citing *Gulfstream Natural Gas System, L.L.C.*, 95 FERC ¶ 61,100 (2001) and *Iroquois Gas Transmission System, L.P.*, 59 FERC ¶ 61,094 at 61,358 (1992)) (FERC has adopted "a liberal intervention policy in natural gas cases at this particular stage of the proceeding," *i.e.*, after an environmental assessment was released but "before an order on the merits has been issued," and granting untimely motion to intervene). The case for intervention here is even stronger. Where FERC granted late intervention in these cases prior to a final decision, DOE/FE, here, has explicitly provided for further environmental consideration before it reaches a decision, thereby inviting interventions of this sort.

Insofar as a further or independent showing of good cause is required, Sierra Club has good cause for seeking to intervene out of time. FERC's intervention orders establish that a party's diligence in seeking intervention is measured by the party's actions after learning that its interests were at stake, rather than looking to when the party simply knew of the proceeding, and these orders have granted motions to intervene filed years out of time. *Jack M. Fuls Tumalo Irrigation Dist.*, 36 FERC ¶ 61136 (July 30, 1986) ("Fuls was fully aware at the time Tumalo filed its license application . . . of the fact that Tumalo's proposal, if licensed, would divert approximately 155 to 160 cfs around Project No. 3473. However, it was not until final design of the project that Fuls determined that the licensing of Project No. 3470 could adversely affect the financial feasibility of his project.") (granting motion filed 30 months after deadline for intervention); *Pennsylvania Power & Light Co.*, 23 FERC ¶ 61006, 61017, 61018 (Apr. 1, 1983) (granting motions filed 19 and 22 months out of time).

Accordingly, Sierra Club appears now because FERC's deficient finding of no significant impact has issued, making it possible, for the first time, to determine whether the environmental review which FERC conducted is sufficient for DOE/FE's purposes. Because that review is inadequate, for the reasons discussed below, Sierra Club's interests are directly implicated, warranting this intervention. Notably, Sierra Club has intervened mere days after FERC completed its review, thereby opening this new phase in this first proceeding.⁵

⁵ The other primary environmental evidence in this matter, the Energy Information Administration's ("EIA") study, commissioned by DOE/FE, which predicts that LNG export will increase domestic coal use in power generation and thereby increase emissions of air pollutants, appeared only months ago, in January of this year. See *Effect of Increased Natural Gas Exports on Domestic Energy Markets*, as requested by the Office of Fossil Energy, U.S. Energy Information Administration – Independent Statistics and Analysis, January 2012, (hereinafter "EIA Study"), attached as Exhibit 2 (Attached as Exhibit 1 to Sierra Club's FERC Filing). To the extent that this study notified Sierra Club of exports' impacts on domestic energy markets and power generation, it presented important new information, which DOE must consider, warranting this intervention.

These facts distinguish Sierra Club's motion from the motion to intervene out of time filed by American Public Gas Association ("APGA") and denied by DOE/FE in a procedural order filed in this docket on March 25, 2011.⁶ APGA argued that it had good cause to intervene because APGA had not been "monitoring export and import applications before the DOE/FE." *Id.* at 4. Thus, APGA's late intervention was not motivated by any factual development other than APGA's own late decision to monitor export applications. The issues APGA raised were purely economic issues, whereas Sierra Club raises the environmental concerns not at issue until now. Moreover, APGA did not demonstrate that its untimely intervention would not adversely impact the proceeding, whereas Sierra Club has made this additional—and more important—showing.

In summary, DOE/FE should interpret its intervention rule, 10 C.F.R. § 590.303(d), to accord with FERC and the federal courts' interpretations of their respective rules for intervention. Because Sierra Club's delay in seeking intervention will not prejudice the proceedings or injure any party, and because Sierra Club has shown good cause for seeking intervention now, DOE/FE should grant the this motion to intervene out of time.

II. Sierra Club Protests this Application Because It Is Not In the Public Interest and Is Not Supported by Adequate Environmental Analysis

LNG export will have significant adverse environmental effects, including inducement of harmful shale gas extraction and "fracking." Under NEPA, DOE/FE cannot approve Sabine Pass's application without acknowledging and studying these effects. Under the Natural Gas Act, DOE/FE cannot approve the application unless (after NEPA review) DOE/FE determines that the application is consistent with the public interest—a determination that must consider environmental impacts. Neither DOE/FE nor FERC has adequately acknowledged or examined these impacts. Nonetheless, the available evidence indicates that these effects are severe enough to rebut any presumption that LNG exports are in the public interest. Sierra Club therefore files this protest pursuant to 10 C.F.R. § 590.304.

A. Legal Framework

DOE/FE has significant substantive and procedural obligations to fulfill under the Natural Gas Act and NEPA before it can authorize Sabine Pass's export proposal.

⁶ [http://www.fossil.energy.gov/programs/gasregulation/authorizations/Orders Issued 2011/10-111-PO APGA.pdf](http://www.fossil.energy.gov/programs/gasregulation/authorizations/Orders%20Issued%202011/10-111-PO%20APGA.pdf)

1. Natural Gas Act

Pursuant to the Natural Gas Act and subsequent delegation orders, DOE/FE must determine whether Sabine Pass's proposal to export LNG to nations which have not signed a free trade agreement ("FTA") with the United States is in the public interest.⁷ Section 3 of the Act provides:

[N]o person shall export any natural gas from the United States to a foreign country or import any natural gas from a foreign country without first having secured an order of the [Federal Power Commission] authorizing it do so. The Commission shall issue such order upon application unless, after opportunity for hearing, it finds that the proposed exportation or importation will not be consistent with the public interest.

15 U.S.C. § 717b(a). Courts, DOE, and DOE/FE have all interpreted this provision to include environmental effects

Beginning with courts, the caselaw establishes that while the public interest inquiry is rooted in the Natural Gas Act's "fundamental purpose [of] assur[ing] the public a reliable supply of gas at reasonable prices," *United Gas Pipe Line Co v. McCombs*, 442 U.S. 529 (1979), the Natural Gas Act also grants DOE/FE "authority to consider conservation, environmental, and antitrust questions." *Nat'l Ass'n for the Advancement of Colored People v. Federal Power Commission*, 425 U.S. 662, 670 n.4 (citing 15 U.S.C. § 17b as an example of a public interest provision); n.6 (explaining that the public interest includes environmental considerations) (1976). In interpreting an analogous public interest provision applicable to hydroelectric power and dams, the Court has explained that the public interest determination "can be made only after an exploration of all issues relevant to the 'public interest,' including future power demand and supply, alternate sources of power, the public interest in preserving reaches of wild rivers and wilderness areas, the preservation of anadromous fish for commercial and recreational purposes, and the protection of wildlife." *Udall v. Fed. Power Comm'n*, 387 U.S. 428, 450 (1967) (interpreting § 7(b) of the Federal Water Power Act of 1920, as amended by the Federal Power Act, 49 Stat. 842, 16 U.S.C. § 800(b)). Other courts have applied this *Udall* holding to the Natural Gas Act. *See, e.g., N. Natural Gas Co. v. Fed. Power Comm'n*, 399 F.2d 953, 973 (D.C. Cir. 1968) (interpreting section 7 of the Natural Gas Act).⁸

⁷ The Natural Gas Act provides that DOE/FE will approve exports to nations that have signed a free trade agreement requiring national treatment for trade in natural gas "without modification or delay." 15 U.S.C. § 717b. DOE/FE has approved such an application from Sabine Pass. *See* DOE/FE Order No. 2833.

⁸ Further support for the inclusion of environmental factors in the public interest analysis is provided by NEPA, which declares that all federal agencies must seek to protect the environment and avoid "undesirable and unintended consequences." 42 U.S.C. 4331(b)(3).

DOE has similarly acknowledged the breadth of the public interest inquiry, including environmental concerns. Deputy Assistant Secretary Smith recently testified that “[a] wide range of criteria are considered as part of DOE’s public interest review process, including... U.S. energy security... [i]mpact on the U.S. economy... [e]nvironmental considerations... [and] [o]ther issues raised by commenters and/or interveners deemed relevant to the proceeding.” Testimony of Christopher Smith, Deputy Assistant Secretary of Oil and Gas Before the Senate Committee on Energy and Natural Resources (Nov. 8, 2011).⁹ DOE rules require export applicants to provide information documenting “[t]he potential environmental impact of the project.” 10 C.F.R. § 590.202(b)(7). In a previous LNG export proceeding, DOE/FE determined that the public interest inquiry looks to “domestic need” as well as “other considerations,” explicitly including the environment. *Phillips Alaska Natural Gas Corporation and Marathon Oil Company*, 2 FE ¶ 70,317, DOE FE Order No. 1473, *22 (April 2, 1999).

DOE/FE’s conditional order in the instant docket also considered environmental factors in the public interest analysis. The conditional order cited potential environmental benefits as part of its public interest analysis, stating that “augmentation of global natural gas supplies will support efforts by overseas electric power generators to switch away from oil or coal, both more carbon intensive and environmentally damaging than natural gas,” that LNG exports might “displace environmentally damaging fuels in those countries,” and that there may be “environmental benefits from greater use of natural gas both domestically and internationally.” DOE/FE Order 2961 at 7, 37, 40. As explained below, more recent studies call these purported benefits into question. On the broader point, however, DOE/FE has already established that environmental factors weigh in to the public interest analysis. This must include environmental harms as well as environmental benefits. *See also id.* at 29 (May 20, 2011) (acknowledging that the public interest inquiry extends beyond effects on domestic natural gas supplies).¹⁰

Although DOE/FE has adopted a presumption that LNG export applications are consistent with the public interest, this presumption is rebuttable and not determinative. The DC Circuit Court has explained to DOE/FE this presumption is “highly flexible, creating *only* rebuttable presumptions and leaving parties free to assert other factors.” *Panhandle Producers and Royalty Owners Ass’n v. Economic Regulatory Administration*, 822 F.2d 1105, 1110-1111, 1113 (D.C. Cir. 1987) (emphasis added, internal quotation marks omitted). Put differently, although DOE/FE may “presume” that an application should be granted, this presumption is not determinative, and DOE/FE retains an independent duty to determine whether an application

⁹ Attached as Exhibit 3.

¹⁰ DOE further applied its “policy guidelines” regarding the public interest to focus review “on the domestic need for the natural gas proposed to be exports; whether the proposed exports pose a threat to the security of natural gas supplies, and *any other issue determined to be appropriate.*” DOE/FE Order 2961 at 29 (emphasis added) (citing 49 Fed. Reg. 6,684 (Feb. 22, 1984)). Although germane here, these Policy Guidelines are merely guidelines: they “cannot create a norm binding the promulgating agency.” *Panhandle Producers and Royalty Owners Ass’n v. Economic Regulatory Administration*, 822 F.2d 1105, 1110-1111 (D.C. Cir. 1987).

is, in fact, in the public interest. See 10 C.F.R. § 590.404.

2. National Environmental Policy Act

NEPA requires federal agencies to consider and disclose the “environmental impacts” of proposed agency actions. 42 U.S.C. § 4332(C)(i). This requirement is implemented via a set of procedures that “insure [sic] that environmental information is available to public officials and citizens *before* decisions are made and *before* actions are taken.” 40 C.F.R. § 1500.1(b) (emphases added). Agencies must “carefully consider [] detailed information concerning significant environmental impacts” and NEPA “guarantees that the relevant information will be made available” to the public. *Dep’t of Transp. v. Public Citizen*, 541 U.S. 752, 768 (2004) (quoting *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989)).

NEPA’s primary procedural requirement is that where a proposed federal action has the potential to “significantly affect[] the quality of the human environment,” the federal agency must prepare an “environmental impact statement” (“EIS”) evaluating these effects. 42 U.S.C. § 4332(C). An EIS is required if there is even a “substantial question” as to the severity of impacts. See *Klamath Siskiyou Wildlands Center v. Boody*, 468 F.3d 549, 561-62 (9th Cir. 2006) (holding that the “substantial question” test sets a “low standard” for plaintiffs to meet), 40 C.F.R. § 1508.27 (defining “significant” impacts as arising from both the context and the intensity of a given action). DOE has categorically determined that “[a]pprovals or disapprovals of authorizations to import or export natural gas . . . involving major operational changes (such as a major increase in the quantity of liquefied natural gas imported or exported)” will “normally require [an] EIS.” 10 C.F.R. Part 1021, Appendix D, D9 (emphasis added); see also 40 C.F.R. § 1501.4 (discussing considerations relevant to whether to prepare an EIS). If it not clear that a proposal will “significantly” affect the environment, the agency may prepare an “environmental assessment” (“EA”) to determine whether an EIS is necessary. 40 C.F.R. § 1508.9.

The “heart” of an EIS is a consideration of alternatives. 40 C.F.R. § 1502.14. FERC’s EA tersely considered a range of alternatives regarding the construction and operation of the terminal, including a “no action” alternative under which LNG would not be exported from Sabine Pass. EA at 3-1 to 3-9. FERC did not, however, consider alternatives available to DOE/FE. As we discuss below, DOE/FE must take care not to define the project purpose so narrowly as to prevent the consideration of a reasonable range of alternatives. See, e.g., *Simmons v. U.S. Army Corps of Engineers*, 120 F.3d 664, 666 (7th Cir. 1997).

NEPA review must also describe the direct effects, indirect effects, and cumulative impacts of a proposed action. 40 C.F.R §§ 1502.16, 1508.7, 1508.8; *Northern Plains Resource Council v. Surface Transportation Board*, 668 F.3d 1067, 1081-82 (9th Cir. 2011). These terms are distinct from one another. Direct effects are “caused by the action and occur at the same time and place.” 40 C.F.R. § 1508.8(a). Indirect effects are also “caused by the action” but:

are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effect on air and water and other natural systems, including ecosystems.

40 C.F.R. § 1508.8(b). Finally, separate from direct and indirect effects, cumulative impacts are impacts that are not causally related to the action but that are:

the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

40 C.F.R. § 1508.7.

The Natural Gas Act designated the old Federal Power Commission as the “lead agency” for NEPA purposes. 15 U.S.C. § 717n. FERC has since generally filled that role, preparing the NEPA documents for LNG export and import decisions. See 10 C.F.R. § 1021.342 (providing for interagency cooperation). FERC took the lead role here, although for the reasons explained below, FERC’s NEPA review is deficient. Regardless of FERC’s role, however, DOE/FE’s ultimate NEPA obligations are the same: DOE/FE may not move forward until the full scope of the action *it* is considering – here the approval of LNG export – has been properly considered under NEPA.

B. DOE/FE’s Conditional Authorization Is Not Final, and DOE/FE Has Committed To Revisiting The Determinations Therein

In this proceeding, DOE/FE issued a *conditional* export authorization prior to any NEPA review. Because the NEPA analysis must inform the ultimate Natural Gas Act public interest determination, DOE/FE must revisit its tentative public interest determination once the NEPA review is complete. DOE/FE has separately acknowledged the tentative nature of its conditional approval and stated that it will not issue a final approval until it has evaluated recent and forthcoming research on the impacts of LNG exports. Thus, the conditional authorization is not final, and further substantive proceedings remain in this case.

DOE/FE’s conditional authorization was pursuant to 10 C.F.R. § 590.402. This regulation specifies that a conditional order is distinct from, and prior to, a final order. *Id.* The order was conditioned on “satisfactory completion of [the] environmental review process . . . and on issuance by DOE/FE of a finding of no significant impact or a record of decision pursuant to

NEPA.” DOE/FE Order 2961 at 43 (emphasis added). Thus, the conditional authorization explicitly commits to further *DOE/FE* review of the environmental impacts prior to issuance of DOE/FE’s final decision.

DOE/FE’s commitment to further and meaningful review is required by NEPA. NEPA’s primary purposes are to ensure informed agency decisionmaking and to inform the public. *Dep’t of Transp. v. Public Citizen*, 541 U.S. 752, 768 (2004). The first purpose requires that NEPA review precede the act of deciding. “[W]hen a decision to which NEPA obligations attach is made without the informed environmental consideration that NEPA requires, the harm that NEPA intends to prevent has been suffered.” *Com. of Mass. v. Watt*, 716 F.2d 946, 952 (1st Cir. 1983) (citing *Alaska v. Andrus*, 580 F.2d 465, 485 (D.C.Cir.1978); *Jones v. District of Columbia Redevelopment Land Agency*, 499 F.2d 502, 512-13 (D.C.Cir.1974)). Although “preliminary consideration of an action” may precede an EA, agencies must “prepare NEPA documents, such as an EA or an EIS, before any irreversible and irretrievable commitment of resources.” *Metcalf v. Daley*, 214 F.3d 1135, 1143 (9th Cir. 2000) (quotation omitted). The Council on Environmental Quality (“CEQ”) directs that agencies must “integrate the NEPA process with other planning at the earliest possible time to insure that planning and decisions reflect environmental values.” 40 C.F.R. § 1501.2. DOE has adopted CEQ’s NEPA regulations in full. 10 C.F.R. § 1021.103. DOE’s own regulations provide that while an EIS is being prepared “DOE shall take no action concerning the proposal that is the subject of the EIS” until the EIS is complete and a formal Record of Decision has been issued. 10 C.F.R. § 1021.211. During this time, DOE may take no action which would tend to “limit the choice of reasonable alternatives,” or “tend[] to determine subsequent development .” 40 C.F.R. § 1506.1. The logic of DOE’s regulations applies with even greater force to preparation of an EA as a possible antecedent to an EIS.

Mere “pro forma” or “post hoc” discussions of environmental impacts violate NEPA. *Churchill County v. Norton*, 276 F.3d 1060, 1072 (9th Cir. 2001) *opinion amended on denial of reh’g*, 282 F.3d 1055 (9th Cir. 2002) (pro forma compliance inadequate); *Calvert Cliffs’ Coordinating Comm., Inc. v. U. S. Atomic Energy Comm’n*, 449 F.2d 1109, 1128 (D.C. Cir. 1971) (same); *Pennaco Energy, Inc. v. U.S. Dept. of Interior*, 377 F.3d 1147, 1159 (10th Cir. 2004) (“post hoc” discussion of environmental impacts inadequate), *accord Sierra Club v. Bosworth*, 510 F.3d 1016, 1026 (9th Cir. 2007), *Dubois v. U.S. Dept. of Agric.*, 102 F.3d 1273, 1289 (1st Cir. 1996). Accordingly, NEPA prohibits DOE/FE from merely signing off on an existing decision once NEPA review is complete.¹¹

DOE has already announced plans to revisit the public interest determination. This announcement was made in a letter sent to Representative Edward J. Markey explained by DOE Deputy Assistant Secretary for Oil and Natural Gas Christopher Smith on February 24, 2012.¹²

¹¹ DOE/FE’s obligation to revisit these issues in turn demonstrates that allowing Sierra Club to intervene will not prolong the proceeding.

¹² Democratic Staff, House Natural Resources Comm., *Drill Here, Sell There, Pay More: The Painful Price of Exporting Natural Gas* (2012) (“*Drill Here, Sell There, Pay More*”), (Appendix 1 at

As this letter explained, in light of the numerous pending export applications, DOE has commissioned a two-part study of the impacts of exports. The first part of this study was completed by the Energy Information Administration (“EIA”) on January 19, 2012. *EIA Study* p.1. The second part is currently underway, as explained in Smith’s letter. In this letter, DOE stated that:

DOE will not issue a *final order* addressing the pending applications to export LNG to non-FTA countries until the full study has been completed and [DOE] has had an opportunity to review the results. . . . *[N]o decision has been made* whether to approve, limit, phase-in, or deny the presently pending or any future proposed export authorizations.

(emphases added) As noted above, 10 C.R.R. § 590.402 states that a conditional order is “prior to,” and therefore distinct from, a “final order.” Thus, DOE has committed to considering the effects of these studies and revisiting its conditional authorization prior to granting a final order to Sabine Pass.

Accordingly, as DOE/FE recognized when issuing the conditional authorization, the conditional authorization is not a final order, and DOE/FE must meaningfully revisit the decision in light of the environmental analysis NEPA requires.

C. DOE/FE Cannot Rest on FERC’s NEPA Review

FERC’s environmental assessment and finding of no significant impact contain faults that preclude DOE/FE from relying on FERC’s assessment. Most egregiously, although there is a strong consensus that exports will induce additional gas production, FERC improperly refused to evaluate the impacts of this increased production. This same inducement was a key element of Sabine Pass’s public interest argument and underlies the public interest analysis in DOE/FE’s conditional authorization. Because FERC’s environmental assessment ignores this effect, the environmental assessment cannot meet DOE/FE’s NEPA obligations. FERC’s NEPA review also suffers additional difficulties that preclude DOE/FE’s reliance thereon.

3), attached as Exhibit 4, available at http://democrats.naturalresources.house.gov/sites/democrats.naturalresources.house.gov/files/content/files/2012-03-01_RPT_NGReport.pdf

1. The Scope of NEPA Review Must Reflect The Scope of DOE/FE's Public Interest Determination

As the Ninth Circuit Court of Appeals recently explained:

Because "NEPA places upon an agency the obligation to consider every significant aspect of the environmental impact of a proposed action," *Vt. Yankee Nuclear Power Corp. v. Natural Res. Def. Council*, 435 U.S. 519, 553, 98 S.Ct. 1197, 55 L.Ed.2d 460 (1978), the considerations made relevant by the substantive statute driving the proposed action must be addressed in NEPA analysis.

Oregon Natural Desert Ass'n v. Bureau of Land Management, 625 F.3d 1092, 1109 (9th Cir. 2010). DOE/FE is determining whether or not gas exports are in the "public interest," a term which the Supreme Court has repeatedly held includes consideration of environmental impacts. *Nat'l Ass'n for the Advancement of Colored People v. Federal Power Commission*, 425 U.S. at 670 n.4; *Udall v. Federal Power Comm'n*, 387 U.S. at 450. Thus, just as DOE/FE must consider upstream environmental impacts in its Natural Gas Act determination, so, too, it must analyze and disclose these impacts in the NEPA analysis that will support its final determination.

2. Export Will Foreseeably Induce Additional Gas Production, As Acknowledged by DOE/FE's Conditional Authorization

LNG export will induce of additional domestic gas production, primarily from shale gas extraction and fracking. FERC refused to address this inducement in its NEPA review, concluding that induced growth in gas production is not a "reasonably foreseeable" consequence of export. *Sabine Pass Liquefaction LLC*, 139 FERC ¶ 61,039, P99. Contrary to FERC's assertion, induced production is eminently foreseeable, as demonstrated by the fact that it *has been foreseen* by DOE/FE, by the Energy Information Administration, by Sabine Pass, by every other company that has applied for LNG export authority, and by FERC itself.

DOE/FE's conditional order states that Sabine Pass "submitted substantial evidence" that export would "enhance[] support for continued natural gas exploration and development activities to supply the export market," and that this evidence was un rebutted. DOE/FE Order 2961 at 37-38. Sabine Pass itself states that "The Sabine Pass LNG Liquefaction Project will play an influential role in contributing to the growth of natural gas production in the U.S." Sabine Pass, Application for Long-Term Authorization to Export Liquefied Natural Gas, p. 56 (Sept. 7, 2010). The six other companies that have filed major LNG export proposals have all made similar statements. Declaration of Nathan Matthews (quoting these applications).¹³ The Energy

¹³ Attached as Exhibit 5.

Information Administration, in a study commissioned by DOE/FE, concluded that across all modeled export scenarios, "[n]atural gas markets in the United States [would] balance in response to increased natural gas exports largely through increased natural gas production." *EIA Study*, 6. EIA predicts that "on average, across all cases and export scenarios," increased shale gas extraction will account for 72 percent of this increase in production. *Id.* at 11. FERC itself states, in the environmental assessment, that the purpose of the project is to "provide a market solution to allow further development of unconventional (particularly shale gas-bearing formation) sources in the United States." FERC, Sabine Pass Environmental Assessment at 1-10.

An increase in natural gas production is therefore at the very least a "probable," rather than a merely "speculative," consequence of LNG export. *Ground Zero Ctr. for Non-Violent Action v. U.S. Dept. of Navy*, 383 F.3d 1082, 1089-90 (9th Cir. 2004) (holding that "foreseeable" impacts are at least probable rather than speculative, and that the Navy was not required to analyze impacts of event with at most a 1 in 100 million chance of occurring). LNG export will foreseeably induce additional natural gas production, primarily from shale gas.

3. The Environmental Impact of Induced Gas Production Is An Indirect and Cumulative Effect of Export, and Must Be Considered under NEPA

As explained below, natural gas production, and shale gas extraction in particular, has significant and well-understood adverse environmental impacts. Because export will induce gas extraction, the aggravation of these environmental impacts is both an indirect and cumulative effect of exports that must be analyzed under NEPA.

The environmental effects of induced gas production are indirect effects of the proposal, because "Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effect on air and water and other natural systems, including ecosystems." 40 C.F.R. § 1508.8(b).

These environmental effects are also cumulative effects, because other similar export proposals (both to FTA and non-FTA countries) have already been filed and are thus reasonably foreseeable. 40 C.F.R. § 1508.7. DOE/FE and FERC are considering non-FTA export proposals which cumulatively propose to export 16.1 bcf/d of LNG when operating at maximum capacity.¹⁴ This is the equivalent of roughly 23% of present total domestic gas production. Energy Information Administration ("EIA"), Monthly Natural Gas Gross Production Report (Jan. 30, 2012)¹⁵ (daily production is ~70 bcf).

¹⁴ http://www.fossil.energy.gov/programs/gasregulation/LNG_Summary_Table_3_23_12.2.pdf (identifying 14.00 Bcf/d of proposals), Application of Corpus Christi Liquefaction, LLC, FERC docket PF12-3 (FERC pre-filing docket for an additional 2.1 Bcf/d exports).

¹⁵ Attached as Exhibit 6.

Thus, the definitions in the statute and binding regulations are clear and plainly apply here. The caselaw further affirms that environmental effects of induced gas production must fall within the scope of NEPA review here. Courts have held that infrastructure project proposals, like Sabine Pass's proposal, that induce expansion of upstream resource extraction must fully analyze the impacts of that expansion in the NEPA framework. In *Northern Plains Resource Council v. Surface Transportation Board*, 668 F.3d 1067 (9th Cir. 2011), for instance, the Court considered a railway line which was developed in order to expand coal production at several mines. *Id.* at 1082. It held that the Surface Transportation Board's NEPA analysis for the line was illegal because the Board had refused to consider the mines' impacts. The Court held that such impacts were plainly "reasonably foreseeable" – and, indeed, were the premise for the construction project in the first place. *Id.* They therefore had to be considered in the NEPA analysis. Sierra Club raised these issues in its comment before FERC. Comment of Sierra Club to FERC on Sabine Pass EA, p. 5-8.¹⁶ FERC wrongly rejected this argument and concluded that these impacts were not reasonably foreseeable.

4. Although DOE/FE's Conditional Authorization Relied on Purported Environmental Benefits of Natural Gas Consumption, FERC's Environmental Assessment Ignored Consumption

FERC's environmental assessment is similarly deficient regarding effects of natural gas consumption. DOE/FE's conditional authorization accepted Sabine Pass's argument that the proposal would benefit produce "environmental benefits from greater use of natural gas both domestically and internationally." DOE/FE Order 2961 at 40. These potential benefits include reduction in international air pollutant emissions when importing countries use natural gas in place of other, dirtier fuels, and reduction in domestic emissions if export facilitates broader development of gas production and similar fuel switching in the United States. *Id.* at 7, 37, 40. Because DOE/FE's conditional order actually relied the assumption that this fuel switching would occur and would produce environmental benefit, DOE/FE cannot claim that this effect is not reasonably foreseeable. DOE/FE therefore cannot rest on a NEPA review that fails to consider these impacts.

Sierra Club raised these issues before FERC in a comment on the environmental assessment, noting that the EIA Study indicated that exports would cause environmentally *harmful* fuel switching domestically, and that the lifecycle analysis of LNG demonstrated that any induced international fuel switching would not meaningfully reduce greenhouse gas emissions. Comment of Sierra Club to FERC on Sabine Pass EA, 8-9 (discussing the EIA Study's conclusions regarding effects fuel switching in the domestic power industry), 10-11 (discussing life-cycle

¹⁶ Sierra Club's comment is attached as Exhibit 7. The exhibits to this comment are not attached, and are instead available at http://elibrary.ferc.gov/IDMWS/search/intermediate.asp?link_file=yes&doclist=13991823

emissions of LNG).¹⁷ FERC did not acknowledge these arguments or the underlying impacts in its finding of no significant impact. Again, however, because DOE/FE has already relied upon these types of environmental impacts in its substantive public interest determination, DOE/FE cannot accept FERC's conclusion that these impacts are beyond the scope of NEPA review.

5. A Full EIS Is Required

DOE/FE cannot issue a final order approving the project without a full environmental impact statement that complies with NEPA. An EIS is required when there is a "substantial question" as to whether a proposed project will have significant impacts. *Klamath Siskiyou Wildlands Center*, 468 F.3d at 561-62. At the very least, there is a substantial question as to whether the impacts FERC failed to consider, such as the environmental effects of induced shale gas drilling, will have a significant impact. Even for the impacts FERC did consider, FERC wrongly concluded that those impacts were insignificant. For example, the liquefaction facility and terminal will annually emit nearly 5 million tons of carbon dioxide equivalent greenhouse gasses (5 million "tpy" "CO₂e"). Five million tpy CO₂e is 200 times the threshold at which CEQ's draft guidance states that agencies should discuss greenhouse gas emissions in their NEPA review. CEQ, *Draft NEPA Guidance on Consideration of The Effects of Climate Change and Greenhouse Gas Emissions*, p.1 (Feb. 18, 2010).¹⁸ It is 50 times the threshold at which stationary sources become subject to Clean Air Act new source review solely on the basis of their greenhouse gas emissions. EPA, *Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule*, 75 Fed. Reg. 31514 (June 3, 2010). In light of the impacts that FERC did and did not analyze in its environmental assessment, it would be arbitrary and capricious for DOE/FE to join in FERC's conclusion that the project will not significantly affect the environment.

Separately, FERC's omission of many foreseeable impacts from its environmental assessment is itself ground for preparing an environmental impact statement, rather than an environmental assessment, going forward. When an agency gives a "cursory and inconsistent treatment" of an issue, or no references or defense of a statement is given, an agency must prepare an EIS. *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1213-14 (9th Cir. 1998).

¹⁷ Sierra Club reiterates these arguments in parts II.D.2 and II.D.3, below. The available evidence indicates that natural gas export will shift overall fuel consumption in ways that will not benefit, and that may likely harm, the environment.

¹⁸ Attached as Exhibit 8, available at <http://www.whitehouse.gov/sites/default/files/microsites/ceq/20100218-nepa-consideration-effects-ghg-draft-guidance.pdf>

6. FERC Did Not Consider an Adequate Range of Alternatives

Both NEPA and the Natural Gas Act require DOE/FE fully to consider alternatives to Sabine Pass's proposal. Because the FERC environmental assessment does not fully explore the alternatives available to DOE/FE, DOE/FE may not rely upon the environmental assessment.

Specifically, the public interest analysis requires an "exploration of all issues relevant to the 'public interest'," an inquiry which the Supreme Court held in *Udall* must be wide-ranging. In that case, which concerned hydropower, the regulatory agency was required to consider, for instance, "alternate sources of power," the state of the power market generally, and options to mitigate impacts on wildlife. Here, likewise, DOE must consider alternatives to the export proposal which would better serve the public interest, broadly analyzing other approaches to structuring LNG exports and gas use generally, given exports' sweeping effects on the economy.

NEPA is designed to support this sort of broad consideration. The alternatives analysis is "the heart of the environmental impact statement," presenting sharply defined issues which offer "clear basis for choice among options by the decisionmaker and the public." 40 C.F.R. § 1502.14. Crucially, the alternatives must include "reasonable alternatives not within the jurisdiction of the lead agency," – meaning that DOE/FE must review actions which it cannot directly order – and must include "appropriate mitigation measures not already included in the proposed action or alternatives." *Id.* Because alternatives are so central to decisionmaking and mitigation, "the existence of a viable but unexamined alternative renders an environmental impact statement inadequate." *Oregon Natural Desert Ass'n*, 625 F.3d at 1122 (internal alterations and citations omitted).

FERC's Sabine Pass environmental assessment considers only a no action alternative (which FERC summarily dismisses), the possibility of using alternative energy sources in other countries, rather than LNG, the possibility of exporting from other terminals, and a few facility-level siting configurations. This consideration is not sufficient for DOE/FE's purposes. See Sabine Pass EA at 3-1 – 3-2. Because DOE is considering the impacts of exports on the public interest, it must look much more broadly than facility-level siting alternatives, as *Udall* indicates, and FERC's bare three alternatives which consider this question somewhat more broadly are not sufficient.

FERC's "no action," "alternative energy source," and "alternative [export] system" alternatives are inadequate for several reasons. The "no action" alternative, first, received essentially no consideration because FERC determined that it would not serve what it viewed as the purpose of the facility siting issue before it: to facilitate LNG export and the "development of unconventional, particularly shale, gas-bearing formations in the U.S." Sabine Pass EA at 3-1. Whether or not FERC was correct to reject the no-action alternative on this ground, DOE/FE may not, because the question before this body is precisely *whether* export, and the increased production it would cause, is in the public interest. Thus, DOE/FE must consider the ramifications of denying export in detail, rather than simply dismiss that possibility.

The “alternative energy source” alternative, which posits that some other fuel might be used abroad, is similarly flawed. Not only does this alternative presuppose that the exports of some sort of fuel should be allowed (which, again, DOE/FE cannot take for granted), it accepts as a given that LNG exports produce greatly lower greenhouse gas emissions than coal. *Id.* As we discuss below, this contention is simply not true, meaning that DOE/FE may not accept FERC’s discussion.

The “alternative [export] system” alternative, finally, shares many of these flaws. FERC rejects the possibility of exporting gas from Alaska or Canada because those locations could not support export from “gas from the Marcellus and Haynesville shale formations.” *Id.* at 3-1 – 3-2. Again, FERC simply assumes that export will occur, and that shale gas production, in particular, must be enhanced. Whether or not FERC could do so for its facility-siting purposes, DOE/FE, again, may not: Because DOE/FE is considering the propriety of export at all, it cannot reject alternatives simply because they would not further export proposals.

Instead, DOE/FE must consider a wide range of alternatives that relate specifically to its broad public interest mandate. Without limiting this consideration, these alternatives should include, at a minimum, consideration of the following:

- (1) Whether, consistent with the EIA study, exports, if allowed, should move forward in smaller quantities or a slower time table to mitigate the domestic economic and environmental impacts associated with large export volumes or rapid export schedules;
- (2) Whether export from other locations would better serve the public interest by mitigating economic or environmental impacts or by limiting the cumulative impacts of multiple terminals located in one region (i.e., the Gulf Coast);
- (3) Whether limitations on the sources of exported gas – e.g., limiting export from particular plays, formations, or regions – would help to mitigate environmental and economic impacts;
- (4) Whether to condition export on the presence of an adequate regulatory framework, including the fulfillment of the recommendations for safe production made by the DOE’s Shale Gas Subcommittee, would better serve the public interest by ensuring that the production increases associated with export will not increase poorly-regulated unconventional gas production;
- (5) Whether to delay, deny, or condition exports based upon their effect on the U.S. utility market (including changes in air pollution emissions associated with the impacts of increased export demand on fuel choice);
- (6) Whether to require exporters to certify that any unconventional gas produced as a result of their proposal (or shipped through their facilities) has been produced in

accordance with all relevant environmental laws and according to a set of best production practices (such as that discussed by the DOE's Shale Gas Subcommittee);

(7) Whether to deny export proposals all together as contrary to the public interest.

Other alternatives are, no doubt, also available, but DOE/FE must, at a minimum, consider the possibilities listed above, as they are reasonable and bear directly on the public interest determination before it. Because FERC's EA considers none of them, DOE/FE may not rely upon it.

D. The Available Evidence Indicates That The Proposal Is Contrary to The Public Interest

The record and available evidence demonstrate that Sabine Pass's export proposal will have significant adverse environmental effects, including harms resulting from induced natural gas production, the lifecycle emissions of LNG, and inducement of additional domestic coal consumption. NEPA requires detailed evaluation of each of these effects. Even absent further the required NEPA review, the record demonstrates that these harms rebut Sabine Pass's claim that the application is in the public interest. Sabine Pass's argument is further weakened by the recent EIA Study, which calls into question Sabine Pass's economic arguments.

1. The Induced Natural Gas Production, Especially Shale Gas Production, Will Harm The Environment

As explained above, the proposed exports will induce additional natural gas production. Natural gas production—from both conventional and unconventional sources—is a significant air pollution source, can disrupt ecosystems and watersheds, leads to industrialization of entire landscapes, and presents challenging waste disposal issues. These impacts were recently highlighted by a Subcommittee of the DOE's Secretary of Energy's Advisory Board, which identified "a real risk of serious environmental consequences" resulting from continued expansion of shale gas production. DOE, Secretary of Energy's Advisory Board, *Shale Gas Production Subcommittee Second 90-Day Report* (Nov. 18, 2011) at 10.¹⁹ Although some states and federal agencies are taking steps to limit these harms, these efforts are uncertain and, even if fully implemented, will not eliminate the environmental harms.

¹⁹ Attached as Exhibit 9. The Board's First 90-Day Report is attached as Exhibit 10. These reports were submitted to FERC as attachments 3 and 2, respectively, to Sierra Club's comment. DOE/FE took administrative notice of these proceedings in its conditional authorization. DOE/FE Order 2961 at 31 n.23.

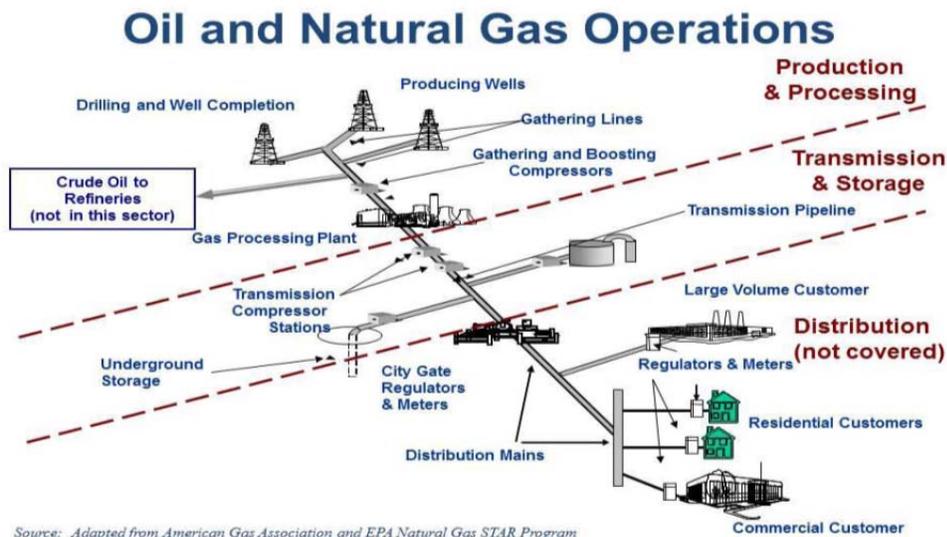
a. Natural Gas Production is a Major Source of Air Pollution

Below, we briefly describe some of the primary air pollution problems caused by the industry. These issues include direct emissions from production equipment and indirect emissions, caused by natural gas replacing cleaner energy sources. EPA is moving to correct some of these problems with new air regulations, to be finalized this April, but as we later discuss, these standards will not fully address the problem. DOE/FE must therefore consider the air pollution impacts of increased natural gas production even if EPA's rules are finalized.

i. Air Pollution Problems from Natural Gas

Oil and gas operations emit methane (CH₄), volatile organic compounds (VOCs), nitrogen oxides (NO_x), sulfur dioxide (SO₂), hydrogen sulfide (H₂S), and particulate matter (PM₁₀ and PM_{2.5}). Oil and natural gas operations also emit listed hazardous air pollutants (HAPs) in significant quantities, and so contribute to cancer risks and other acute public health problems. Pollutants are emitted during all stages of natural gas development, including (1) oil and natural gas production, (2) natural gas processing, (3) natural gas transmission, and (4) natural gas distribution.²⁰ Within these development stages, the major sources of air pollution include wells, compressors, pipelines, pneumatic devices, dehydrators, storage tanks, pits and ponds, natural gas processing plants, and trucks and construction equipment.

Figure 1: The Oil and Natural Gas Sector



²⁰ EPA, Oil and Natural Gas Sector: Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution, Background Technical Support Document for the Proposed Rules ("TSD") at 2-4 (July 2011), attached as Exhibit 11.

Methane: Methane is the dominant pollutant from the oil and gas sector. Emissions occur as result of intentional venting or unintentional leaks during drilling, production, processing, transmission and storage, and distribution. For example, methane is emitted when wells are completed and vented, as part of operation of pneumatic devices and compressors, and as a result of leaks (fugitive emissions) in pipelines, valves, and other equipment. EPA has identified natural gas systems as the “single largest contributor to United States anthropogenic methane emissions.”²¹ The industry is responsible for over 40% of total U.S. methane emissions.²² Methane causes harm both because of its contributions to climate change and as an ozone precursor.

Beginning with climate change, methane is a potent greenhouse gas that contributes substantially to global climate change. Methane has at least 25 times the global warming potential of carbon dioxide over a 100 year time frame and at least 72 times the global warming potential of carbon dioxide over a 20-year time frame.²³ The oil and gas production industry’s methane emissions amount to 5% of all carbon dioxide equivalent (CO₂e) emissions in the country.²⁴

Because of methane’s effects on climate, EPA has found that methane, along with five other well-mixed greenhouse gases, endangers public health and welfare within the meaning of the Clean Air Act.²⁵ The impacts of climate change caused by methane and other greenhouse gases include “increased air and ocean temperatures, changes in precipitation patterns, melting and thawing of global glaciers and ice, increasingly severe weather events, such as hurricanes of greater intensity and sea level rise.”²⁶ A warming climate will also lead to loss of coastal land in densely populated areas, shrinking snowpack in Western states, increased wildfires, and reduced crop yields.²⁷ More frequent heat waves as a result of global warming have already affected public health, leading to premature deaths. And threats to public health are only expected to increase as global warming intensifies. For example, a warming climate will lead to

²¹ 76 Fed. Reg. 52,738, 52,792 (Aug. 23, 2011) (EPA proposed air rules for oil and gas production sector), attached as Exhibit 12.

²² *Id.* at 52,791–92.

²³ IPCC 2007—*The Physical Science Basis*, Section 2.10.2, and IPCC 2007- *Summary for Policymakers*, attached as Exhibit 13. We note that these global warming potential figures may be revised upward in the next IPCC report. A more recent study by Shindell *et al.* estimates methane’s 100-year GWP at 33; this same source estimates methane’s 20-year GWP at 105.

²⁴ 76 Fed. Reg. 52,738 at 52,791–92.

²⁵ EPA, Endangerment and Cause or Contribute Findings for Greenhouse Gases, 74 Fed. Reg. 66,496, 66,516 (Dec. 15, 2009) (“Endangerment Finding”), attached as Exhibit 14.

²⁶ 76 Fed. Reg. at 52,791-22 (citing U.S. EPA, 2011 U.S. GREENHOUSE GAS INVENTORY REPORT EXECUTIVE SUMMARY (2011), <http://www.epa.gov/climateexchange/emissions/downloads11/US-GHGInventory-2011-ExecutiveSummary.pdf>, attached as Exhibit 15).

²⁷ *Id.* at 66,532–33.

increased incidence of respiratory and infectious disease, greater air and water pollution, increased malnutrition, and greater casualties from fire, storms, and floods.²⁸ Vulnerable populations—such as children, the elderly, and those with existing health problems—are the most at risk from these threats.

Methane also reacts in the atmosphere to form ozone.²⁹ As we discuss below, ozone is a major public health threat, linked to a wide range of maladies. Ozone can also damage vegetation, agricultural productivity, and cultural resources. Ozone is also a significant greenhouse gas in its own right, meaning that methane is doubly damaging to climate – first in its own right, and then as an ozone precursor.

Volatile Organic Compounds (VOCs) and NO_x: The gas industry is a major source of the ozone precursors VOCs and NO_x.³⁰ VOCs are emitted from well drilling and completions, compressors, pneumatic devices, storage tanks, processing plants, and fugitives from production and transmission.³¹ The primary sources of NO_x are compressor engines, turbines, and other engines used in drilling and hydraulic fracturing.³² NO_x is also produced when gas is flared or used for heating.³³ VOCs and NO_x contribute to the formation of ground-level ozone (also referred to as smog). Smog pollution harms the respiratory system and has been linked to premature death, heart failure, chronic respiratory damage, and premature aging of the lungs.³⁴ Smog may also exacerbate existing respiratory illnesses, such as asthma and emphysema, or cause chest pain, coughing, throat irritation and congestion. Children, the

²⁸ EPA, *Climate Change, Health and Environmental Effects*, available at <http://epa.gov/climatechange/effects/health.html>, attached as Exhibit 16.

²⁹ 76 Fed. Reg. at 52,791.

³⁰ See, e.g., EPA Fact Sheet at 3; Al Armendariz, Emissions from Natural Gas Production in the Barnett Shale Area and Opportunities for Cost-Effective Improvements (Jan. 26, 2009), available at http://www.edf.org/documents/9235_Barnett_Shale_Report.pdf (hereinafter “Barnett Shale Report”) at 24, attached as Exhibit 17.

³¹ See, e.g., TSD at 4-7, 5-6, 6-5, 7-9, 8-1; see also Barnett Shale Report at 24.

³² See, e.g., TSD at 3-6; See also Barnett Shale Report at 24, Air Quality Impact Analysis Technical Support Document for the Revised Draft Supplemental Environmental Impact Statement for the Pinedale Anticline Oil and Gas Exploration and Development Project at 11 (Table 2.1), available at http://www.blm.gov/pgdata/etc/medialib/blm/wy/information/NEPA/pfodocs/anticline/seis.Par.58477.File.dat/27vol1_aqtsd.pdf

³³ TSD at 3-6; Colorado Department of Public Health and Environment, *Colorado Visibility and Regional Haze State Implementation Plan for the Twelve Mandatory Class I Federal Areas in Colorado*, Appendix D at 1 (2011), available at <http://www.cdphe.state.co.us/ap/RegionalHaze/AppendixD/4-FactorHeaterTreaters07JAN2011FINAL.pdf>.

³⁴ RIA at 4-25; Jerrett *et al.*, *Long-Term Ozone Exposure and Mortality*, *New England Journal of Medicine* (Mar. 12, 2009), available at <http://www.nejm.org/doi/full/10.1056/NEJMoa0803894#t=articleTop>, attached as Exhibit 18.

elderly, and people with existing respiratory conditions are the most at risk from ozone pollution.³⁵

Significant ozone pollution also damages plants and ecosystems.³⁶ Ozone also contributes substantially to global climate change over the short term. According to a recent study by the United Nations Environment Program (UNEP), behind carbon dioxide and methane, ozone is now the third most significant contributor to human-caused climate change.³⁷

As a result of significant VOC and NO_x emissions associated with oil and gas development, numerous areas of the country with heavy concentrations of drilling are now suffering from serious ozone problems. For example, the Dallas Fort Worth area in Texas is home to substantial oil and gas development. Within the Barnett shale region, as of September 2011, there were more than 15,306 gas wells and another 3,212 wells permitted.³⁸ Of the nine counties surrounding the Dallas Fort Worth area that EPA has designated as “nonattainment” for ozone, five contain significant oil and gas development.³⁹ A 2009 study found that summertime emissions of smog-forming pollutants from these counties were roughly comparable to emissions from motor vehicles in those areas.⁴⁰

Oil and gas development has also brought serious ozone pollution problems to rural areas, such as western Wyoming.⁴¹ On March 12, 2009, the governor of Wyoming recommended that the state designate Wyoming’s Upper Green River Basin as an ozone nonattainment area.⁴² The

³⁵ See EPA, *Ground-Level Ozone, Health Effects*, available at <http://www.epa.gov/glo/health.html> attached as Exhibit 19. EPA, Nitrogen Dioxide, Health, available at <http://www.epa.gov/air/nitrogenoxides/health.html>, attached as Exhibit 20.

³⁶ RIA at 4-26.

³⁷ *Id.* See also United Nations Environment Programme and World Meteorological Organization, (2011): *Integrated Assessment of Black Carbon and Tropospheric Ozone: Summary for Decision Makers* (hereinafter “UNEP Report,” available at http://www.unep.org/dewa/Portals/67/pdf/Black_Carbon.pdf), at 7, attached as Exhibit 21.

³⁸ Texas Railroad Commission, <http://www.rrc.state.tx.us/data/fielddata/barnettshale.pdf> (Accessed Nov. 21, 2011), attached as Exhibit 22.

³⁹ Barnett Shale Report at 1, 3.

⁴⁰ *Id.* at 1, 25-26.

⁴¹ Schnell, R.C, et al. (2009), “Rapid photochemical production of ozone at high concentrations in a rural site during winter,” *Nature Geosci.* 2 (120 – 122). DOI: 10.1038/NGEO415, attached as Exhibit 23.

⁴² See Letter from Wyoming Governor Dave Freudenthal to Carol Rushin, Acting Regional Administrator, USEPA Region 8, (Mar. 12, 2009) (“Wyoming 8-Hour Ozone Designation Recommendations”), available at <http://deq.state.wy.us/out/downloads/Rushin%20Ozone.pdf>, attached as Exhibit 24; Wyoming Department of Environmental Quality, Technical Support Document I for Recommended 8-hour Ozone Designation of the Upper Green River Basin (March 26, 2009) (“Wyoming Nonattainment Analysis”), at vi-viii, 23-26, 94-05, available at

Wyoming Department of Environmental Quality conducted an extended assessment of the ozone pollution problem and found that it was “primarily due to local emissions from oil and gas . . . development activities: drilling, production, storage, transport, and treating.”⁴³ Last winter alone, the residents of Sublette County suffered thirteen days with ozone concentrations considered “unhealthy” under EPA’s current air-quality index, including days when the ozone pollution levels exceeded the worst days of smog pollution in Los Angeles.⁴⁴ Residents have faced repeated warnings regarding elevated ozone levels and the resulting risks of going outside.⁴⁵

Ozone problems are mounting in other Rocky Mountain states as well. Northeastern Utah recorded unprecedented ozone levels in the Uintah Basin in 2010 and 2011. In the first three months of 2010—which was the first time that winter ozone was monitored in the region—air quality monitors measured more than 68 exceedances of the federal health standard. On three of these days, the levels were almost twice the federal standard.⁴⁶ Between January and March 2011, there were 24 days where the National Ambient Air Quality Standard (NAAQS) for ozone were exceeded in the area. Again, ozone pollution levels climbed to nearly twice the federal standard.⁴⁷ The Bureau of Land Management (BLM) has identified the multitude of oil and gas wells in the region as the primary cause of the ozone pollution.⁴⁸

http://deq.state.wy.us/out/downloads/Ozone%20TSD_final_rev%203-30-09_jl.pdf, attached as Exhibit 25.

⁴³ Wyoming Nonattainment Analysis at viii.

⁴⁴ EPA, *Daily Ozone AQI Levels in 2011 for Sublette County, Wyoming*, available at http://www.epa.gov/cgi-bin/broker?msaorcountyName=countycode&msaorcountyValue=56035&poll=44201&county=56035&msa=-1&sy=2011&flag=Y&_debug=2&_service=data&_program=dataprog.trend_tile_dm.sas, attached as Exhibit 26; see also Wendy Koch, *Wyoming's Smog Exceeds Los Angeles' Due to Gas Drilling*, USA Today, available at <http://content.usatoday.com/communities/greenhouse/post/2011/03/wyomings-smog-exceeds-los-angeles-due-to-gas-drilling/1>, attached as Exhibit 27.

⁴⁵ See, e.g., *2011 DEQ Ozone Advisories*, Pinedale Online! (Mar. 17, 2011) (documenting ten ozone advisories in February and March 2011), available at <http://www.pinedaleonline.com/news/2011/03/OzoneCalendar.htm>, attached as Exhibit 28; Wyoming Department of Environmental Quality, *Ozone Advisory for Monday, Feb. 28, Pinedale Online!* (Feb. 27, 2011), available at <http://www.pinedaleonline.com/news/2011/02/OzoneAdvisoryforMond.htm>, attached as Exhibit 29.

⁴⁶ Scott Streater, *Air Quality Concerns May Dictate Uintah Basin's Natural Gas Drilling Future*, N.Y. TIMES, Oct. 1, 2010, available at <http://www.nytimes.com/gwire/2010/10/01/01greenwire-air-quality-concerns-may-dictate-uintah-basins-30342.html?pagewanted=1> (last visited Sept. 28, 2011), attached as Exhibit 30.

⁴⁷ See EPA, AirExplorer, Query Concentrations (Ozone, Uintah County, 2011), available at http://www.epa.gov/cgi-bin/htSQL/mxplorer/query_daily.hspl?msaorcountyName=countycode&msaorcountyValue=49047&poll=44201&county=49047&site=-1&msa=-1&state=-

Rampant oil and gas development in Colorado and New Mexico is also leading to high levels of VOCs and NO_x. In 2008, the Colorado Department of Public Health and Environment concluded that the smog-forming emissions from oil and gas operations exceed vehicle emissions for the entire state.⁴⁹ Moreover, significant additional drilling has occurred since 2008. Colorado is now home to more than 46,000 wells.⁵⁰ There is also significant development in the San Juan Basin in southeastern Colorado and northwestern New Mexico, with approximately 35,000 wells in the Basin. As a result of this development and several coal-fired power plants in the vicinity, the Basin suffers from serious ozone pollution.⁵¹ This pollution is taking a toll on residents of San Juan County. The New Mexico Department of Public Health has documented increased emergency room visits associated with high ozone levels in the County.⁵²

VOC and NO_x emissions from oil and gas development are also harming air quality in national parks and wilderness areas. Researchers have determined that numerous “Class I areas” – a designation reserved for national parks, wilderness areas, and other such lands⁵³ – are likely to be impacted by increased ozone pollution as a result of oil and gas development in the Rocky Mountain region, including Mesa Verde National Park and Weminuche Wilderness Area in Colorado and San Pedro Parks Wilderness Area, Bandelier Wilderness Area, Pecos Wilderness Area, and Wheeler Peak Wilderness Area in New Mexico.⁵⁴ These areas are all near concentrated oil and gas development in the San Juan Basin.⁵⁵

[1&sy=2011&flag=Y&query=download&_debug=2&_service=data&_program=dataprog.query_daily3P_dm.sas](#), attached as Exhibit 31.

⁴⁸ BLM, *GASCO Energy Inc. Uinta Basin Natural Gas Development Draft Environmental Impact Statement* (“GASCO DEIS”), at 3-13, available at http://www.blm.gov/ut/st/en/fo/vernal/planning/nepa/_gasco_energy_eis.html, attached as Exhibit 32.

⁴⁹ Colo. Dept. of Public Health & Env’t, Air Pollution Control Division, *Oil and Gas Emission Sources, Presentation for the Air Quality Control Commission Retreat*, at 3-4 (May 15, 2008), attached as Exhibit 33.

⁵⁰ Colorado Oil & Gas Conservation Commission, *Colorado Weekly & Monthly Oil and Gas Statistics*, at 12 (Nov. 7, 2011), available at <http://cogcc.state.co.us/> (library—statistics—weekly/monthly well activity), attached as Exhibit 34.

⁵¹ See *Four Corners Air Quality Task Force Report of Mitigation Options*, at vii (Nov. 1, 2007), available at <http://www.nmenv.state.nm.us/aqb/4C/TaskForceReport.html>, attached as Exhibit 35.

⁵² Myers et al., *The Association Between Ambient Air Quality Ozone Levels and Medical Visits for Asthma in San Juan County* (Aug. 2007), available at <http://www.nmenv.state.nm.us/aqb/4c/Documents/SanJuanAsthmaDocBW.pdf>, attached as Exhibit 36.

⁵³ See 42 U.S.C. § 7472(a).

⁵⁴ Rodriguez et al., *Regional Impacts of Oil and Gas Development on Ozone Formation in the Western United States*, 59 *Journal of the Air and Waste Management Association* 111 (Sept.

As oil and gas development moves into new areas, particularly as a result of the boom in development of shale resources, ozone problems are likely to follow. For example, regional air quality models predict that gas development in the Haynesville shale will increase ozone pollution in northeast Texas and northwest Louisiana and may lead to violations of ozone NAAQS.⁵⁶ Experts also anticipate air quality problems associated with development of the Marcellus shale in the Mid-Atlantic region.⁵⁷ In particular, the state of Delaware has conducted an extensive analysis of NOx pollution from the oil and gas sector, in part because Delaware is downwind from the Marcellus gas plays which projects like FLEX's proposal would support.⁵⁸ It demonstrates that Delaware and other downwind states will experience significant NOx pollution if production increases without appropriate controls.

Sulfur dioxide: Oil and gas production emits sulfur dioxide, primarily from natural gas processing plants.⁵⁹ Sulfur dioxide is released as part of the sweetening process, which removes hydrogen sulfide from the gas.⁶⁰ Sulfur dioxide is also created when gas containing hydrogen sulfide (discussed below) is combusted in boilers or heaters.⁶¹

Sulfur dioxide causes respiratory problems, including increased asthma symptoms. Short-term exposure to sulfur dioxide has been linked to increased emergency room visits and hospital admissions. Sulfur dioxide reacts in the atmosphere to form particulate matter (PM), an air pollutant which causes a great deal of harm to human health.⁶² PM is discussed separately below.

2009), available at http://www.wrapair.org/forums/amc/meetings/091111_Nox/Rodriguez_et_al_OandG_Impacts_JAWMA9_09.pdf, attached as Exhibit 37.

⁵⁵ *Id.* at 1112.

⁵⁶ See Kembball-Cook et al., *Ozone Impacts of Natural Gas development in the Haynesville Shale* 44 *Environ. Sci. Technol.* 9357, 9362 (Nov. 18, 2010), attached as Exhibit 38.

⁵⁷ Elizabeth Shogren, *Air Quality Concerns Threaten Natural Gas's Image*, National Public Radio (June 21, 2011), available at <http://www.npr.org/2011/06/21/137197991/air-quality-concerns-threaten-natural-gas-image>, attached as Exhibit 39.

⁵⁸ See Delaware Department of Natural Resources and Environmental Quality, *Background Information Oil and Gas Sector Significant Sources of NOx Emissions* (2011) attached as Exhibit 40.

⁵⁹ 76 Fed. Reg. at 52,756.

⁶⁰ TSD 3-3 to 3-5.

⁶¹ 76 Fed. Reg. at 52,756.

⁶² EPA, Sulfur Dioxide, Health, available at <http://www.epa.gov/air/sulfurdioxide/health.html>, attached as Exhibit 41.

Hydrogen sulfide: Some natural gas contains hydrogen sulfide. When hydrogen sulfide levels are above a specific threshold, gas is classified as “sour gas.”⁶³ According to EPA, there are 14 major areas in the U.S., found in 20 different states, where natural gas tends to be sour.⁶⁴ All told, between 15 and 20% of the natural gas in the U.S. may contain hydrogen sulfide.⁶⁵

Given the large amount of drilling in areas with sour gas, EPA has concluded that the potential for hydrogen sulfide emissions from the oil and gas industry is “significant.”⁶⁶ Hydrogen sulfide may be emitted during all stages of development, including exploration, extraction, treatment and storage, transportation, and refining.⁶⁷ For example, hydrogen sulfide is emitted as a result of leaks from processing systems and from wellheads in sour gas fields.⁶⁸

Hydrogen sulfide is an air pollutant with toxic properties that smells like rotten eggs and can lead to neurological impairment or death. Long-term exposure to hydrogen sulfide is linked to respiratory infections, eye, nose, and throat irritation, breathlessness, nausea, dizziness, confusion, and headaches.⁶⁹ Although hydrogen sulfide was originally included in the Clean Air Act’s list of hazardous air pollutants, it was removed with industry support.⁷⁰

⁶³ 76 Fed. Reg. at 52,756. Gas is considered “sour” if hydrogen sulfide concentration is greater than 0.25 grain per 100 standard cubic feet, along with the presence of carbon dioxide. *Id.*

⁶⁴ EPA, Office of Air Quality Planning and Standards, *Report to Congress on Hydrogen Sulfide Air Emissions Associated with the Extraction of Oil and Natural Gas* (EPA-453/R-93-045), at ii (Oct. 1993) (hereinafter “EPA Hydrogen Sulfide Report”); available at <http://nepis.epa.gov/Exe/ZyNET.exe/00002WG3.TXT?ZyActionD=ZyDocument&Client=EPA&Index=1991+Thru+1994&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C91thru94%5Ctxt%5C00000006%5C00002WG3.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=p%7Cf&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL>, attached as Exhibit 42.

⁶⁵ Lana Skrtic, *Hydrogen Sulfide, Oil and Gas, and People’s Health* (“Skrtic Report”), at 6 (May 2006), available at http://www.earthworksaction.org/pubs/hydrogensulfide_oilgas_health.pdf, attached as Exhibit 43.

⁶⁶ EPA Hydrogen Sulfide Report at III-35.

⁶⁷ *Id.* at ii.

⁶⁸ TSD at 2-3.

⁶⁹ EPA Hydrogen Sulfide Report at i.

⁷⁰ See Pub. L. 102-187 (Dec. 4, 1991). We do not concede that this approval was appropriate. Hydrogen sulfide meets section 112 of the Clean Air Act’s standards for listing as a hazardous air pollutant, and should be so regulated.

Hydrogen sulfide emissions from the oil and gas industry are concerning because this pollutant may be harmful even at low concentrations.⁷¹ Although direct monitoring of hydrogen sulfide around oil and gas sources is limited, there is evidence that these emissions may be substantial, and have a serious impact on people's health. For example, North Dakota reported 3,300 violations of an odor-based hydrogen sulfide standard around drilling wells.⁷² People in northwest New Mexico and western Colorado living near gas wells have long complained of strong odors, including but not limited to hydrogen sulfide's distinctive rotten egg smell. Residents have also experienced nose, throat and eye irritation, headaches, nose bleeds, and dizziness.⁷³ An air sample taken by a community monitor at one family's home in western Colorado in January 2011 contained levels of hydrogen sulfide concentrations 185 times higher than safe levels.⁷⁴

Particulate Matter (PM): The oil and gas industry is a major source of PM pollution. This pollution is generated by heavy equipment used to move and level earth during well pad and road construction. Vehicles also generate fugitive dust by traveling on access roads during drilling, completion, and production activities.⁷⁵ Diesel engines used in drilling rigs and at compressor stations are also large sources of fine PM/diesel soot emissions. VOCs are also a precursor to formation of PM_{2.5}.⁷⁶

PM consists of tiny particles of a range of sizes suspended in air. Small particles pose the greatest health risk. These small particles include "inhalable coarse particles," which are smaller than 10 micrometers in diameter (PM₁₀), and "fine particles" which are less than 2.5 micrometers in diameter (PM_{2.5}). PM₁₀ is primarily formed from crushing, grinding or abrasion of surfaces. PM_{2.5} is primarily formed by incomplete combustion of fuels or through secondary formation in the atmosphere.⁷⁷

PM causes a wide variety of health and environmental impacts. PM has been linked to respiratory and cardiovascular problems, including coughing, painful breathing, aggravated

⁷¹ See James Collins & David Lewis, Report to CARB, Hydrogen Sulfide: Evaluation of Current California Air Quality Standards with Respect to Protections of Children (Sept. 1, 2000), available at <http://oehha.ca.gov/air/pdf/oehhah2s.pdf>, attached as Exhibit 44.

⁷² EPA Hydrogen Sulfide Report at III-35.

⁷³ See Global Community Monitor, Gassed! Citizen Investigation of Toxic Air Pollution from Natural Gas Development, at 11-14 (July 2011), attached as Exhibit 45.

⁷⁴ *Id.* at 21.

⁷⁵ See BLM, GASCO Energy Inc. Uinta Basin Natural Gas Development Project Draft Environmental Impact Statement, at App. J at 2 (Oct. 2010) ("GASCO DEIS")

⁷⁶ RIA at 4-18.

⁷⁷ See EPA, Particulate Matter, Health, available at <http://www.epa.gov/pm/health.html>, attached as Exhibit 46; BLM, *West Tavaputs Plateau Natural Gas Full Field Development Plan Final Environmental Impact Statement* ("West Tavaputs FEIS"), at 3-19 (July 2010), available at http://www.blm.gov/ut/st/en/fo/price/energy/Oil_Gas/wtp_final_eis.html.

asthma attacks, chronic bronchitis, decreased lung function, heart attacks, and premature death. Sensitive populations, include the elderly, children, and people with existing heart or lung problems, are most at risk from PM pollution.⁷⁸ PM also reduces visibility,⁷⁹ and may damage important cultural resources.⁸⁰ Black carbon, a component of PM emitted by combustion sources such as flares and older diesel engines, also warms the climate and thus contributes to climate change.⁸¹

PM emissions from the oil and gas industry are leading to significant pollution problems. For example, monitors in Uintah County and Duchesne County, Utah have repeatedly measured wintertime PM_{2.5} concentrations above federal standards.⁸² These elevated levels of PM_{2.5} have been linked to oil and gas activities in the Uinta Basin.⁸³ West Tavaputs FEIS at 3-20. Modeling also shows that road traffic associated with energy development is pushing PM₁₀ levels very close to violating NAAQS standards.⁸⁴

ii. Recent Studies Indicate Even Greater Air Quality Impacts

The air quality risks discussed above are serious but the most recent studies available demonstrate that those risks, if anything, underestimated. These studies, based on direct monitoring of gas operations in Colorado, show actual emissions larger than those in EPA's estimates, and links unconventional gas drilling, specifically, to increased cancer risk. These serious threats to public health and the environment argue strongly against granting this application.

The first of these studies, by a consortium of researchers led by the National Ocean and Atmospheric Administration (NOAA) Earth System Research Laboratory, monitored air quality around oil and gas fields.⁸⁵ It observed high levels of methane, propane, benzene, and other volatile organic compounds, in the air around the fields. The researchers write that their "analysis suggests that the emissions of the species we measured" – that is the cancer-causing,

⁷⁸ RIA at 4-19; EPA, Particulate Matter, Health

⁷⁹ EPA "Visibility – Basic Information" <http://www.epa.gov/visibility/what.html>, attached as Exhibit 47.

⁸⁰ See EPA, Particulate Matter, Health; West Tavaputs EIS, at 3-19; RIA at 4-24.

⁸¹ UNEP Report at 6; IPCC (2007) at Section 2.4.4.3.

⁸² GASCO DEIS at 3-12.

⁸³ West Tavaputs FEIS, at 3-20 (July 2010).

⁸⁴ See GASCO DEIS at 4-27.

⁸⁵ G. Petron *et al.*, *Hydrocarbon emissions characterization in the Colorado Front Range: A pilot study*, 117 J. of Geophysical Research 4304, DOI 10.1029/2011JD016360 (2012), attached as Exhibit 48.

smog-forming, and climate-disrupting pollutants released from these operations – “are most likely underestimated in current inventories,” perhaps by as much as a factor of two.⁸⁶

These emissions have dire practical consequences. A second research team, led by the Colorado School of Public Health, measured benzene and other pollutants released from unconventional well completions.⁸⁷ Elevated levels of these pollutants correspond to increased cancer risks for people living within half of a mile from a well⁸⁸ – a very large population which will increase as drilling expands. Thus, the increased gas production that Freeport touts comes along with increased cancer risk in the areas where that production occurs.

In short, the more we learn about pollution associated with unconventional gas production, the worse that pollution appears to be. DOE/FE must weigh these risks as it considers this license; if it weighs them properly, it must conclude that the proposal is not in the public interest because increased production substantially threatens public health.

iii. EPA’s Air Rules Will Not Fully Address These Air Pollution Problems

Although EPA’s proposed new source performance standards and standards for hazardous air pollutants should, if finalized, reduce some of these pollution problems, they will not solve them. The rules, first, do not even address some pollutants, including NO_x, methane, and hydrogen sulfide. Second, the rules do not control existing sources of air pollution (though, as proposed, they do require emissions controls at well completions of existing unconventional wells), meaning that increased use of existing infrastructure will produce emissions uncontrolled by the rules. Third, without full enforcement, the rules will not reduce emissions completely. Fourth, the rules will not address important emissions effects of LNG in particular, including LNG exports’ tendency to increase the use of coal power. Thus, though DOE/FE might work with EPA to fully understand the emissions levels likely after the rules are fully implemented, it may not rely upon the EPA rules to avoid weighing and disclosing these impacts.

⁸⁶ *Id.* at 4304.

⁸⁷ L. McKenzie *et al.*, *Human Health Risk Assessment of Air Emissions from Development of Unconventional Natural Gas Resources*, *Science of the Total Environment* (In Press, Mar. 22, 2012), attached as Exhibit 49.

⁸⁸ *Id.* at 2.

b. Gas Production Disrupts Landscapes and Habitats

Increased oil and gas production will transform the landscape of regions overlying shale gas plays, bringing industrialization to previously rural landscapes and significantly affecting ecosystems, plants, and animals. These impacts are large, and difficult to manage.

Land use disturbance associated with gas development impacts plants and animals through direct habitat loss, where land is cleared for gas uses, and indirect habitat loss, where land adjacent to direct losses loses some of its important characteristics.

Regarding direct losses, land is lost through development of well pads, roads, pipeline corridors, corridors for seismic testing, and other infrastructure. The Nature Conservancy (“TNC”) estimated that in Pennsylvania, “Well pads occupy 3.1 acres on average while the associated infrastructure (roads, water impoundments, pipelines) takes up an additional 5.7 acres, or a total of nearly 9 acres per well pad.” TNC, *Pennsylvania Energy Impacts Assessment, Report 1: Marcellus Shale Natural Gas and Wind* (2010) at 10, *see also id.* at 18.⁸⁹ New York’s Department of Environmental Conservation reached similar estimates. New York Department of Environmental Conservation’s Revised Draft Supplemental General Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program, 5-5 (Sept. 2011) (hereinafter “NY RDSGEIS”).⁹⁰ After initial drilling is completed the well pad is partially restored, but 1 to 3 acres of the well pad will remain disturbed through the life of the wells, estimated to be 20 to 40 years. *Id.* at 6-13. Associated infrastructure such as roads and corridors will likewise remain disturbed. Because these disturbances involve clearing and grading of the land, directly disturbed land is no longer suitable as habitat. *Id.* at 6-68.

Indirect losses occur on land that is not directly disturbed, but where habitat characteristics are affected by direct disturbances. “Adjacent lands can also be impacted, even if they are not directly cleared. This is most notable in forest settings where clearings fragment contiguous forest patches, create new edges, and change habitat conditions for sensitive wildlife and plant species that depend on “interior” forest conditions.” TNC, *Pennsylvania Energy Impacts Assessment, Report 1: Marcellus Shale Natural Gas and Wind* at 10. “Research has shown measureable impacts often extend at least 330 feet (100 meters) into forest adjacent to an edge.” NY RDSGEIS 6-75.

TNC’s study of the impacts of gas extraction in Pennsylvania is particularly telling. TNC mapped projected wells across the state, considering how the wells and their associated infrastructure, including roads and pipelines, interacted with the landscape. TNC’s conclusions make for grim reading. It concluded:

⁸⁹ Attached as Exhibit 50.

⁹⁰ Available at <http://www.dec.ny.gov/data/dmn/rdsgeisfull0911.pdf>.

- About 60,000 new Marcellus wells are projected by 2030 in Pennsylvania with a range of 6,000 to 15,000 well pads, depending on the number of wells per pad;
- Wells are likely to be developed in at least 30 counties, with the greatest number concentrated in 15 southwestern, north central, and northeastern counties;
- Nearly two thirds of well pads are projected to be in forest areas, with forest clearing projected to range between 34,000 and 83,000 acres depending on the number of number of well pads that are developed. An additional range of 80,000 to 200,000 acres of forest interior habitat impacts are projected due to new forest edges created by well pads and associated infrastructure (roads, water impoundments);
- On a statewide basis, the projected forest clearing from well pad development would affect less than one percent of the state’s forests, but forest clearing and fragmentation could be much more pronounced in areas with intensive Marcellus development;
- Approximately one third of Pennsylvania’s largest forest patches (>5,000 acres) are projected to have a range of between 1 and 17 well pads in the medium scenario;
- Impacts on forest interior breeding bird habitats vary with the range and population densities of the species. The widely-distributed scarlet tanager would see relatively modest impacts to its statewide population while black-throated blue warblers, with a Pennsylvania range that largely overlaps with Marcellus development area, could see more significant population impacts;
- Watersheds with healthy eastern brook trout populations substantially overlap with projected Marcellus development sites. The state’s watersheds ranked as “intact” by the Eastern Brook Trout Joint Venture are concentrated in north central Pennsylvania, where most of these small watersheds are projected to have between two and three dozen well pads;
- Nearly a third of the species tracked by the Pennsylvania Natural Heritage Program are found in areas projected to have a high probability of Marcellus well development, with 132 considered to be globally rare or critically endangered or imperiled in Pennsylvania. Several of these species have all or most of their known populations in Pennsylvania in high probability Marcellus gas development areas.
- Marcellus gas development is projected to be extensive across Pennsylvania’s 4.5 million acres of public lands, including State Parks, State Forests, and State Game Lands. Just over 10 percent of these lands are legally protected from surface development.

TNC, *Pennsylvania Energy Impacts Assessment, Report 1: Marcellus Shale Natural Gas and Wind* (2010) at 29.⁹¹ Increased gas production will exacerbate these problems, which is bad news for the state's lands and wildlife, and the hunting, angling, tourism, and forestry industries which depend upon them. Although TNC adds that impacts could be reduced with proper planning, *id.*, more development makes mitigation more difficult. Indeed, the Pennsylvania Department of Conservation and Natural Resources recently concluded that "zero" remaining acres of the state forests are suitable for leasing with surface disturbing activities, or the forests will be significantly degraded. Penn. Dep't of Conservation and Natural Resources, *Impacts of Leasing Additional State Forest for Natural Gas Development* (2011).⁹² These costs are not in the public interest.

These effects will harm rural economies and decrease property values, as major gas infrastructure transforms and distorts the existing landscape. They will also harm endangered species in regions where production would increase in response to FLEX's exports. For example, dozens of endangered and threatened species inhabit the Marcellus region, including in forests, streams, and coastal areas which will be affected by gas development.⁹³ Harm to these species and their habitat is, too, against the profound public interest in species conservation, as expressed in the Endangered Species Act and similar statutes.

c. Gas Production Poses Risks to Ground and Surface Water

Hydraulic fracturing involves injecting a base fluid (typically water),⁹⁴ sand or other proppant, and various fracturing chemicals into the gas-bearing formation at high pressures to fracture the rock and release additional gas. Each step of this process presents a risk to water resources. Withdrawal of the water may overtax the water source. Fracking itself may contaminate groundwater with either chemicals added to the fracturing fluid or with naturally occurring chemicals mobilized by fracking. After the well is fracked, some water will return to the surface, composed of both fracturing fluid and naturally occurring "formation" water. This water, together with drilling muds and drill cuttings, must be disposed of without further endangering water resources.

⁹¹ See Exhibit 50.

⁹² Attached as Exhibit 51.

⁹³ See Maryland DNR, *Rare, Threatened & Endangered Animals & Rare, Threatened & Endangered Plants* (2012), attached as Exhibit 52; Pennsylvania Game Commission, *Threatened and Endangered Species* (2012), attached as Exhibit 53. If FLEX's proposal harms any of these species, or their habitat, directly or indirectly, it will be against the public interest. DOE/FE must consider harms to all endangered and threatened species in its public interest analysis.

⁹⁴ The majority of hydraulic fracturing operations are conducted with a water based fracturing fluid. Fracking may also be conducted with oil or synthetic-oil based fluid, with foam, or with gas.

i. Water Withdrawals

The first step is the procurement of water. The precise amount of water varies by the shale formation being fracked; FLEX predicts that its export proposal will induce shale gas development in all of the country's shale gas plays. To use one example formation, fracking a Marcellus Shale well requires between 4 and 5 million gallons of water. TNC, *Pennsylvania Energy Impacts Assessment, Report 1: Marcellus Shale Natural Gas and Wind*, 5.⁹⁵ Fresh water constitutes 80% to 90% of the total water used a well even where operators recycle "flowback" water from the fracking of previous well for use in fracking the current one. New York Department of Environmental Conservation's *Revised Draft Supplemental General Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program*, 6-13 (Sept. 2011) (hereinafter "NY RDSGEIS").⁹⁶

Water withdrawals can drastically impact aquatic ecosystems and human communities. Reductions in instream flow negatively affect aquatic species by changing flow depth and velocity, raising water temperature, changing oxygen content, and altering streambed morphology. *Id.* 6-3 to 6-4. Even when flow reductions are not themselves problematic, the intake structures can harm aquatic organisms. *Id.* at 6-4. Where water is withdrawn from aquifers, rather than surface sources, withdrawal risks permanent depletion. This risk is even more prevalent with withdrawals for fracking than it is for other withdrawal, because fracking is a consumptive use. Fluid injected during the fracking process is (barring accident) deposited below freshwater aquifers and into sealed formations. *Id.* 6-5; DOE Subcommittee First 90 day report at 19 ("in some regions and localities there are significant concerns about consumptive water use for shale gas development."). Thus, the water withdrawn from the aquifer will be used in a way that provides no opportunity to percolate back down to the aquifer and recharge it.

⁹⁵ Accord New York Department of Environmental Conservation's *Revised Draft Supplemental General Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program*, (September 2011) ("Between July 2008 and February 2011, average water usage for high-volume hydraulic fracturing within the Susquehanna River Basin in Pennsylvania was 4.2 million gallons per well, based on data for 553 wells."), available at <http://www.dec.ny.gov/data/dmn/rdsgeisfull0911.pdf>. Other estimates are that as much as 7.2 million gallons of frack fluid may be used in a 4000 foot well bore. NRDC, *et al.*, *Comment on NY RDSGEIS on the Oil, Gas and Solution Mining Regulatory Program* (Jan. 11, 2012) (Attachment 2, Report of Tom Myers, at 10), attached as Exhibit 54 (hereafter *Comment on NY RDSGEIS*). These comments were attached as Exhibits 7 & 8 in Sierra Club's FERC filing.

Water needs in other geological formations vary. See Exhibit 10 (SEAB 90-Day Report) at 19 (estimating that nationwide, fracking an individual well requires between 1 and 5 million gallons of water).

⁹⁶ Available at <http://www.dec.ny.gov/energy/75370.html>

ii. Fracturing

Fracturing poses a serious risk of groundwater contamination. Contaminants include chemicals added to the fracturing fluid and naturally occurring chemicals that are mobilized from deeper formations to groundwater by the fracking process. Contamination may occur through several methods, including where the well casing fails or where the created fractures intersect an existing a poorly sealed well. Although information on groundwater contamination is incomplete, the available research indicates that contamination has already occurred on multiple occasions.

One category of potential contaminants includes chemicals added to the drilling mud and fracturing fluid. The fluid used for slickwater fracturing is typically comprised of more than 98% fresh water and sand, with chemical additives comprising 2% or less of the fluid. NY RDSGEIS 5-40. Chemicals are added as solvents, surfactants, friction reducers, gelling agents, bactericides, and for other purposes. *Id.* 5-49. New York recently identified 322 unique ingredients used in fluid additives, recognizing that this constituted a partial list. *Id.* 5-41. These chemicals include petroleum distillates; aromatic hydrocarbons; glycols; glycol ethers; alcohols and aldehydes; amides; amines; organic acids, salts, esters and related chemicals; microbicides; and others. *Id.* 5-75 to 5-78. Many of these chemicals present health risks. *Id.* Of particular note is the use of diesel, which the DOE Subcommittee has singled out for its harmful effects and recommended be banned from use as a fracturing fluid additive. DOE Subcommittee First 90-Day Report, 25. The minority staff of the House Committee on Energy and Commerce determined that despite diesel's risks, between 2005 and 2009 "oil and gas service companies injected 32.2 million gallons of diesel fuel or hydraulic fracturing fluids containing diesel fuel in wells in 19 states." Natural Resources Defense Council, Earthjustice, and Sierra Club, *Comments [to EPA] on Permitting Guidance for Oil and Gas Hydraulic Fracturing Activities Using Diesel Fuels* (June 29, 2011) at 3 (quoting Letter from Reps. Waxman, Markey, and DeGette to EPA Administrator Lisa Jackson (Jan. 31, 2001) at 1) (hereafter Comment on Diesel Guidance).⁹⁷

Contamination may also result from chemicals naturally occurring in the formation. Flowback and produced water "may include brine, gases (e.g. methane, ethane), trace metals, naturally occurring radioactive elements (e.g. radium, uranium) and organic compounds." DOE Subcommittee first 90 day report at 21; *see also* Comment on NY RDSGEIS (attachment 3, Report of Glen Miller, at 2). For example, mercury naturally occurring in the formation becomes mixed in with water-based drilling muds, resulting in up to 5 pounds of mercury in the mud per well drilled in the Marcellus region. Comment on NY RDSGEIS (attachment 1, Report of Susan Harvey, at 92).

There are several vectors by which these chemicals can reach groundwater supplies. Perhaps the most common or significant are inadequacies in the casing of the vertical well bore. DOE Subcommittee First 90 Day Report, 20. The well bore inevitably passes through geological strata

⁹⁷ Attached as Exhibit 55.

containing groundwater, and therefore provides a conduit by which chemicals injected into the well or traveling from the target formation to the surface may reach groundwater. The well casing isolates the groundwater from intermediate strata and the target formation. This casing must be strong enough to withstand the pressures of the fracturing process--the very purpose of which is to shatter rock. Multiple layers of steel casing must be used, each pressure tested before use, then centered within the well bore. Each layer of casing must be cemented, with careful testing to ensure the integrity of the cementing. Comment on Diesel Guidance, 5-9. Proper casing construction is an elaborate engineering effort, with multiple layers of steel casing (that have been pressure tested), centralizers to center the casing in the well bore, careful cementing of the casing strings (together with testing to ensure the integrity of this cementing). *Id.*

Separate from casing failure, contamination may occur when the zone of fractured rock intersects an abandoned and poorly-sealed well or natural conduit in the rock. Comment on NY RDSGEIS (Attachment 3, Report of Tom Myers, 12 - 15).

Available data indicates that fracking has resulting in groundwater contamination in at least five documented instances. One study “documented the higher concentration of methane originating in shale gas deposits . . . into wells surrounding a producing shale production site in northern Pennsylvania.” DOE Subcommittee first 90 day report at 20 (citing Stephen G. Osborn, Avner Vengosh, Nathaniel R. Warner, and Robert B. Jackson, *Methane contamination of drinking water accompanying gas-well drilling and hydraulic fracturing*, Proceedings of the National Academy of Science, 108, 8172-8176, (2011)). By looking at particular isotopes of methane, this study was able to determine that the methane originated in the shale deposit, rather than from a shallower source. *Id.* The DOE Subcommittee referred to this as “a recent, credible, peer-reviewed study.” *Id.* Two other reports “have documented or suggested the movement of fracking fluid from the target formation to water wells linked to fracking in wells.” Comment on NY RDSGEIS (Attachment 2, Report of Tom Meyers, 13). “Thyne (2008)^[98] had found bromide in wells 100s of feet above the fracked zone.” *Id.* “The EPA (1987)^[99] documented fracking fluid moving into a 416- foot deep water well in West Virginia; the gas well was less than 1000 feet horizontally from the water well, but the report does not indicate the gas-bearing formation.” *Id.*

More recently, EPA has investigated groundwater contamination in Pavillion, Wyoming and Dimock, Pennsylvania. In Pavillion, EPA’s draft report concludes that “when considered together with other lines of evidence, the data indicates likely impact to ground water that can

⁹⁸ Dr. Meyers relied on Thyne, G. 2008. *Review of Phase II Hydrogeologic Study*. Prepared for Garfield County, Colorado.

⁹⁹ Environmental Protection Agency. 1987. Report to Congress, Management of Wastes from the Exploration, Development, and Production of Crude Oil, Natural Gas, and Geothermal Energy, Volume 1 of 3, Oil and Gas. Washington, D.C., available at nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=20012D4P.txt, attached as Exhibit 56.

be explained by hydraulic fracturing.” EPA, Draft Investigation of Ground Water Contamination near Pavillion, Wyoming (Dec. 2011), at xiii.¹⁰⁰ EPA tested water from wells extending to various depths within the range of local groundwater. At the deeper tested wells, EPA discovered inorganics (potassium, chloride), synthetic organic (isopropanol, glycols, and tert-butyl alcohol), and organics (BTEX, gasoline and diesel range organics) at levels higher than expected. *Id.* at xii. At shallower levels, EPA detected “high concentrations of benzene, xylenes, gasoline range organics, diesel range organics, and total purgeable hydrocarbons.” *Id.* at xi. EPA determined that surface pits previously used for storage of drilling wastes and produced/flowback waters were a likely source of contamination for the shallower waters, and that fracturing likely explained the deeper contamination. *Id.* at xi, xiii. Although this is a draft report in an ongoing investigation, it demonstrates a possibility of contamination that DOE must consider in its public interest evaluation.

EPA is also investigating groundwater contamination in Dimock, Pennsylvania. EPA Region III, *Action Memorandum - Request for Funding for a Removal Action at the Dimock Residential Groundwater Site* (Jan. 19, 2012).¹⁰¹ In Dimock, EPA has determined that “a number of home wells in the Dimock area contain hazardous substances, some of which are not naturally found in the environment.” *Id.* at 1. Specifically, wells are contaminated with arsenic, barium, bis(2(ethylhexyl)phthalate, glycol compounds, manganese, phenol, and sodium. *Id.* at 3-4. Many of these chemicals are hazardous substances as defined under CERCLA section 101(14); see also 40 C.F.R. § 302.4. EPA’s determination is based on “Pennsylvania Department of Environmental Protection (PADEP) and Cabot Oil and Gas Corporation (Cabot) sampling information, consultation with an EPA toxicologist, the Agency for Toxic Substances and Disease Registry (ATSDR) Record of Activity (AROA), issued, 12/28/11, and [a] recent EPA well survey effort.” *Id.* The PADEP information provided reason to believe that drilling activities in the area led to contamination of these water supplies. Drilling in the area began in 2008, and was conducted using the hazardous substances that have since been discovered in well water. *Id.* at 1, 2. Shortly thereafter methane contamination was detected in private well water. *Id.* at 2. In addition, there were several surface spills in connection with the drilling operation. *Id.* at 1. After the contamination was detected, PADEP entered a consent decree with Cabot which required permanent restoration or replacement of the water supply. *Id.* at 2. Cabot has installed or is installing a “gas mitigation” system for the affected wells. *Id.*, see also Agency for Toxic Substances and Disease Registry, *Record of Activity/Technical Assist* (Dec. 28, 2011) at 2 (hereafter ATSDR).¹⁰²

Pursuant to the consent decree, Cabot was providing replacement water to all 18 homes until November 30, 2011, at which point Cabot halted deliver with PADEP’s consent. ATSDR at 2. EPA

¹⁰⁰ Attached as Exhibit 57, available at

http://www.epa.gov/region8/superfund/wy/pavillion/EPA_ReportOnPavillion_Dec-8-2011.pdf

¹⁰¹ Attached as Exhibit 58, available at

<http://www.epaos.org/sites/7555/files/Dimock%20Action%20Memo%2001-19-12.PDF>

¹⁰² Attached as Exhibit 59, available at <http://www.epa.gov/aboutepa/states/dimock.pdf>

has intervened because “EPA does not know what, if any, hazardous substances these ‘gas mitigation’ systems, originally designed to address methane, are removing.” EPA Action Memorandum at 2. EPA plans to sample water from approximately 61 home wells, and to provide alternative drinking water supplies to the four homes with the most contaminated wells in the interim. *Id.* at 6.

iii. Waste Management

Fracturing produces a variety of liquid and solid wastes that must be managed and disposed of. These include the drilling mud used to lubricate the drilling process, the drill cuttings removed from the well bore, the “flowback” of fracturing fluid that returns to the surface in the days after fracking, and produced water that is produced over the life of the well (a mixture of water naturally occurring in the shale formation and lingering fracturing fluid). These wastes contain the same contaminants described in the preceding section. They present environmental hazards with regard to their onsite management and with their eventual disposal.

On site, drilling mud, drill cuttings, flowback and produced water are often stored in pits. Such open pits can have harmful air emissions, can leach into shallow groundwater water, and can fail and result in surface discharges. Many of these harms can be minimized by the use of seal tanks in a “closed loop” system. *See, e.g.,* NY RDSGEIS at 1-12. Presently, only New Mexico mandates the use of closed loop waste management systems, and pits remain in use elsewhere.

Flowback and produced water must ultimately be disposed of offsite. Some of these fluids may be recycled and used in further fracturing operations, but even where a fluid recycling program is used, recycling leaves concentrated contaminants that must be disposed of. The most common methods of disposal are disposal in underground injection wells or through water treatment facilities leading to eventual surface discharge.

Underground injection wells present risks of groundwater contamination similar to those identified above for fracking itself. Gas production wastes are not categorized as hazardous under the Safe Drinking Water Act, 42 U.S.C. § 300f *et seq.*, and may be disposed of in Class II injection wells. Class II wells are brine wells, and the standards and safeguards in place for these wells were not designed with the contaminants found in fracking wastes in mind. *See also* NRDC *et al.*, Petition for Rulemaking Pursuant to Section 6974(a) of the Resource Conservation and Recovery Act Concerning the Regulation of Wastes Associated with the Exploration, Development, or Production of Crude Oil or Natural Gas or Geothermal Energy (Sept. 8, 2010).¹⁰³

¹⁰³ Attached as Exhibit 60, available at http://docs.nrdc.org/energy/files/ene_10091301a.pdf

Additionally, underground injection of fracking wastes appears to have induced earthquakes in several regions. Underground injection of fracking waste in Ohio has been correlated with earthquakes as high as 4.0 on the Richter scale. Columbia University, Lamont-Doherty Earth Observatory, *Ohio Quakes Probably Triggered by Waste Disposal Well, Say Seismologists* (Jan. 6, 2012).¹⁰⁴ Underground injection may cause earthquakes by causing movement on existing fault lines: “Once fluid enters a preexisting fault, it can pressurize the rocks enough to move; the more stress placed on the rock formation, the more powerful the earthquake.” *Id.* Underground injection is more likely than fracking to trigger large earthquakes via this mechanism, “because more fluid is usually being pumped underground at a site for longer periods.” *Id.* In light of the apparent induced seismicity, Ohio has put a moratorium on injection in the affected region. *Id.* Similar associations between earthquakes and injection have occurred in Arkansas, Texas, Oklahoma and the United Kingdom. *Id.*, Alexis Flynn, *Study Ties Fracking to Quakes in England*, Wall Street Journal (Nov. 3, 2011).¹⁰⁵ In light of these effects, Ohio and Arkansas have placed moratoriums on injection in the affected areas. Lamont-Doherty Earth Observatory; Arkansas Oil and Gas Commission, *Class II Commercial Disposal Well or Class II Disposal Well Moratorium* (Aug. 2, 2011).¹⁰⁶ The recently released abstract of a forthcoming United States Geological Survey study affirms the connection between disposal wells and earthquakes. Ellsworth, W. L., *et al.*, *Are Seismicity Rate Changes in the Midcontinent Natural or Manmade?*, Seismological Society of America, (April 2012).¹⁰⁷

As an alternative to underground injection, flowback and produced water is also sent to water treatment facilities, leading to eventual surface discharge. This presents a separate set of environmental hazards, because these facilities (particularly publicly owned treatment works) are not designed to handle the nontraditional pollutants found in fracking wastes. For example:

One serious problem with the proposed discharge (dilution) of fracture treatment wastewater via a municipal or privately owned treatment plant is the observed increases in trihalomethane (THM) concentrations in drinking water reported in the public media (Frazier and Murray, 2011), due to the presence of increased bromide concentrations. Bromide is more reactive than chloride in formation of trihalomethanes, and even though bromide concentrations are generally lower than chloride

¹⁰⁴ Attached as Exhibit 61, available at <http://www.ldeo.columbia.edu/news-events/seismologists-link-ohio-earthquakes-waste-disposal-wells>

¹⁰⁵ Attached as Exhibit 62, available at <http://online.wsj.com/article/SB10001424052970203804204577013771109580352.html>

¹⁰⁶ Attached as Exhibit 63, available at <http://www.aogc.state.ar.us/Hearing%20Orders/2011/July/180A-2-2011-07.pdf>

¹⁰⁷ This abstract is attached as Exhibit 64, and is available at http://www2.seismosoc.org/FMPro?-db=Abstract_Submission_12&-recid=224&-format=%2Fmeetings%2F2012%2Fabstracts%2Fsessionabstractdetail.html&-lay=MtgList&-find

concentrations, the increased reactivity of bromide generates increased amounts of bromodichloromethane and dibromochloromethane (Chowdhury, et al., 2010). Continued violations of an 80microgram/L THM standard may ultimately require a drinking water treatment plant to convert from a standard and cost effective chlorination disinfection treatment to a more expensive chloramines process for water treatment. Although there are many factors affecting THM production in a specific water, simple (and cheap) dilution of fracture treatment water in a stream can result in a more expensive treatment for disinfection of drinking water. This transfer of costs to the public should not be permitted.

Comment on NY RDSGEIS (attachment 3, Report of Glen Miller, at 13). Similarly, municipal treatment works typically do not treat for radioactivity, whereas produced water can have high levels of naturally occurring radioactive materials. In one examination of three samples of produced water, radioactivity (measured as gross alpha radiation) were found ranging from 18,000 pCi / L to 123,000 pCi/L, whereas the safe drinking water standard is 15 pCi/L. *Id.* (Miller Report at 4).

2. The Project Will Harm The Environment by Inducing Some Domestic Electricity Generators to Switch from Gas to Coal

Separate from the effects resulting from induced natural gas production, Sabine Pass's export proposal will increase air pollution by increasing the amount of coal used for electricity production.

DOE/FE's conditional authorization concluded that export may lead to "environmental benefits from greater use of natural gas . . . domestically." DOE/FE Order 2961 at 40. The environmental benefits of natural gas DOE/FE describes are those that accrue when gas replaces coal. Accordingly, the only apparent basis for the quoted statement is the assumption that export will bolster and provide stability to domestic natural gas production, and that development of this industry will facilitate switching from coal to natural gas.

The EIA Study, however, refutes this reasoning. The EIA predicts that LNG export will increase domestic natural gas prices, including potential wellhead price increases of 10 to 50%. *EIA Study* at 6, 8. DOE/FE specifically requested that EIA study this issue to inform DOE/FE's processing of LNG export operations, and it would be arbitrary and capricious for DOE/FE to use the Navigant price estimates Sabine Pass provided in its application rather than those produced by the independent government analysis absent a detailed showing of the superiority of Sabine Pass's estimates.

The price increases EIA predicts will decrease domestic consumption of natural gas, primarily in the electric power sector. *Id.* at 6. The power sector will "primarily" respond by shifting to coal-

fired generation, and only secondarily to renewable sources. *Id.*, *see also id.* at 17 ("higher natural gas prices lead electric generators to burn more coal and less natural gas."). Specifically, EIA predicts that the decrease in 72 percent of the decrease in gas-fired electricity production will be replaced by coal-fired production, with increased liquid fuel consumption, increased renewable generation, and decreases in total consumption making up the remainder (8, 9, and 11 percent, respectively). *Id.* at 18.

The shift from gas- to coal-fired electricity generation will increase emissions of both traditional air pollutants and greenhouse gases. As DOE/FE stated in its conditional authorization, coal is "both more carbon intensive and environmentally damaging than natural gas," DOE/FE Order 2961 at 37, although as discussed in the following section, this combustion advantage is partially offset by the greenhouse gas emissions resulting from gas production.

Thus, exports will increase domestic gas prices, increasing domestic coal use, and thereby increasing domestic greenhouse gas emissions. The *EIA Study* examined the effects of 6 or 12 bcf/d of exports, phased in slowly or quickly, together with various estimates for the extent of shale gas reserves and the pace of US economic development. EIA concluded that under every scenario exports would produce a significant increase in domestic greenhouse gas emissions, as illustrated by the table below.

Table 4: Cumulative CO₂ Emissions from 2015 to 2035 With Various Export Scenarios¹⁰⁸

Case	no added exports				
	no added exports	low/slow	low/rapid	high/slow	high/rapid
Reference					
Cumulative carbon dioxide emissions	125,056	125,699	125,707	126,038	126,283
Change from baseline		643	651	982	1,227
Percentage change from baseline		0.5%	0.5%	0.8%	1.0%
High Shale EUR					
Cumulative carbon dioxide emissions	124,230	124,888	124,883	125,531	125,817
Change from baseline		658	653	1,301	1,587
Percentage change from baseline		0.5%	0.5%	1.0%	1.3%
Low Shale EUR					
Cumulative carbon dioxide emissions	125,162	125,606	125,556	125,497	125,670
Change from baseline		444	394	335	508
Percentage change from baseline		0.4%	0.3%	0.3%	0.4%
High Economic Growth					
Cumulative carbon dioxide emissions	131,675	131,862	132,016	131,957	132,095
Change from baseline		187	341	282	420
Percentage change from baseline		0.1%	0.3%	0.2%	0.3%

Source: U.S. Energy Information Administration, National Energy Modeling System, with emissions related to natural gas assumed to be consumed in the liquefaction process included.

¹⁰⁸ From the *EIA Study* (Exhibit 2) at 19.

The fact that gas exports will tend to favor coal as a fuel for domestic electrical generation has particularly important implications for national emissions control efforts. EPA has just released proposed carbon pollution standards for electricity generating units which set emissions levels based upon the performance of natural gas combined-cycle plants. *See* 77 Fed. Reg. 22,392 (Apr. 13, 2012). EPA anticipates no notable compliance costs for the rule because it expects utilities to react to low gas prices, among other factors, by avoiding constructing expensive coal-fired plants. *See id.* at 22,430. If LNG exports move forward, however, gas prices will increase, making it more difficult and expensive to capture combustion-side carbon pollution reductions from fossil-fuel fired power plants. This interference with national efforts to control global warming, which endangers public health and welfare, *see* 74 Fed. Reg. 66,496 (Dec. 15, 2009), is not in the public interest.

Finally, we note that one of the purposes of NEPA is to ensure that issues like this are fully considered *before* the agency makes a decision. DOE/FE's initial assumption that exports might ultimately improve the combustion emissions of domestic electricity generation is not itself problematic, insofar as this assumption simply identified an issue that should have been fully explored during NEPA review. Indeed, Sierra Club raised the EIA Study's conclusion about export's effects on domestic electricity generation as an issue FERC should have addressed during the NEPA process.¹⁰⁹ Now that FERC has excluded this issue—which DOE/FE has already relied on—from the NEPA review, NEPA imposes an independent obligation on DOE/FE to examine these potential impacts *before* finalizing its public interest determination.

3. The EIA Study and Recent Lifecycle Analyses Demonstrate that The Environmental Benefits DOE/FE's Conditional Authorization Relied on Are Overstated or Non-existent

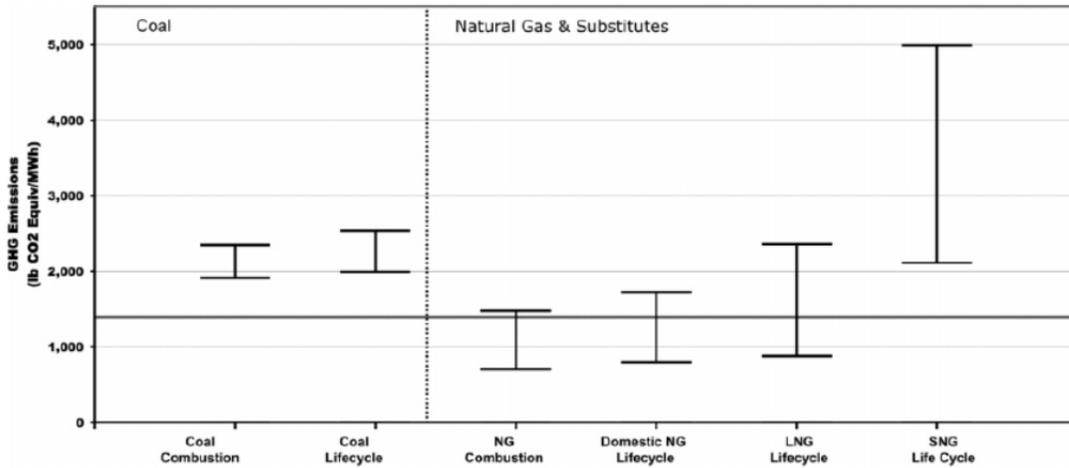
The conditional authorization also concluded that export would "augment[] of global natural gas supplies [and therefore] support efforts by overseas electric power generators to switch away from oil or coal, both more carbon intensive and environmentally damaging than natural gas." DOE/FE Order 2961 at 37. Again, this conclusion should have been, but was not, investigated during the NEPA review. *See Sierra Club Comment on Sabine Pass EA* at 10-11. Such investigation would have revealed recent studies that demonstrate that the lifecycle emissions of LNG derived from shale gas (which the EIA Study concludes will supply the additional demand for LNG export) has little, if any, climate advantage over coal.

Because LNG requires additional energy to liquefy, transport, and then regasify, its energy and emissions lifecycle releases substantially more greenhouse pollution than that of gas generally, whether conventionally or unconventionally sourced. In fact, according to the only published lifecycle study of LNG used for electricity generation of which we are aware, these upstream

¹⁰⁹ *See EIA Study* (Exhibit 2) at 8-9.

emissions are sufficient to push LNG lifecycle emissions well above those of natural gas generally, and into the range of coal emissions.

Figure 2: Life-Cycle Emissions of LNG, Natural Gas, and Coal in Electricity Generation¹¹⁰



This study understates the emissions of LNG, because it predates the recent boom in unconventional gas sources and assumes gas will come from conventional extraction.¹¹¹ The study also predates EPA’s recent action to raise emissions estimates from conventional gas production. Because unconventional gas already has higher emissions than conventional gas, *liquefied* unconventional gas will have higher emissions still, further erasing any daylight between LNG and other fossil fuel emissions.

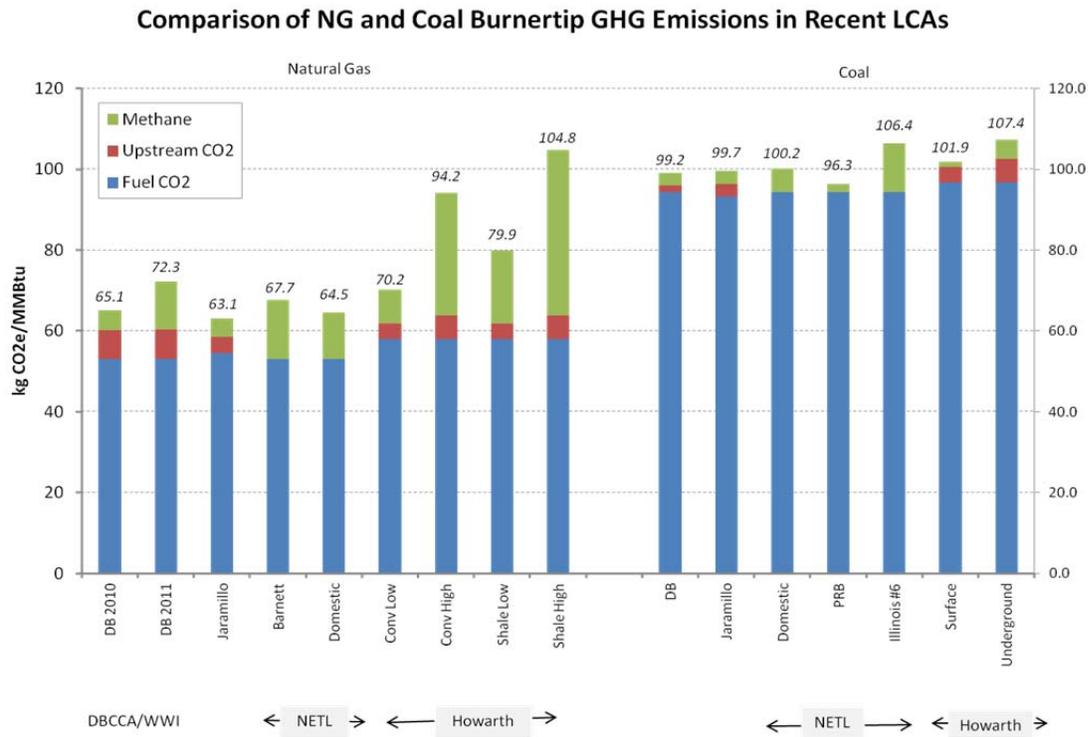
Numerous studies have attempted to calculate just how much the upstream methane emissions from conventional and unconventional natural gas degrade natural gas’s combustion advantage over coal. Most studies find that natural gas retains *some* advantage, although these studies do not incorporate the additional emissions from liquefaction and transportation. One of the most recent of these studies, a report from the Worldwatch Institute and Deutsche

¹¹⁰ From Jaramillo et al., *Comparative Life-Cycle Air Emissions of Coal, Domestic Natural Gas, LNG, and SNG for Electricity Generation*, 41 Environ. Sci. Technol. 6,290, 6,295 (2007), attached as Exhibit 65. “SNG,” in the figure, refers to synthetic natural gas made from coal. The study was attached as Exhibit 9 in Sierra Club’s FERC filing on Sabine Pass.

¹¹¹ EPA recently estimated methane emissions from a conventional well completion at only 0.76 tons, while an unconventional well completion yielded 150.6 tons of methane.¹¹¹ EPA, *Oil and Natural Gas Sector: Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution; Background Technical Support Document for Proposed Standards* (July 2011) at Table 4-6, see Exhibit 11. See Exhibit 11. As noted above, EIA predicts that, averaged across all export scenarios, 72% of the additional gas production induced by export will come from shale gas. *EIA Study* at 11.

Bank,¹¹² synthesizes three other reports, which were prepared by Dr. Robert Howarth et al., of Cornell,¹¹³ Mohan Jiang et al. of Carnegie-Mellon,¹¹⁴ and Timothy Skone of NETL.¹¹⁵ As the figure below shows, whether viewed in absolute terms as a very large methane source, on in relative terms in the context of energy production, increased gas extraction is accompanied by increased greenhouse gas emissions.

Figure 3:



The above chart considers domestic gas consumption, and does not include the additional emissions associated with LNG.

¹¹² Mark Fulton et al., *Comparing Life-Cycle Greenhouse Gas Emissions from Natural Gas and Coal* (Aug. 25, 2011), attached as Exhibit 66 .

¹¹³ Robert W. Howarth et al., *Methane and the greenhouse-gas footprint of natural gas from shale formations*, *Climactic Change* (Mar. 2011), attached as Exhibit 67.

¹¹⁴ Mohan Jiang et al., *Life cycle greenhouse gas emissions of Marcellus shale gas*, *Environ. Res. Letters* 6 (Aug. 2011), attached as Exhibit 68.

¹¹⁵ Timothy J. Skone, *Life Cycle Greenhouse Gas Analysis of Natural Gas Extraction and Delivery in the United States*, Presentation to Cornell (May 12, 2011), attached as Exhibit 69. NETL has also put out a fuller version of this analysis. See Timothy J. Skone, *Life Cycle Greenhouse Gas Inventory of Natural Gas Extraction, Delivery and Electricity Production* (Oct. 24, 2011), attached as Exhibit 70.

Insofar as DOE/FE found that gas was superior to oil, rather than coal, recent studies call this into question as well. A recent study examined the climate effects of switching gasoline and diesel fueled vehicles to compressed natural gas, including the emissions from fuel production and transportation. Ramon Alvarez et al., *Greater focus needed on methane leakage from natural gas infrastructure*, Proceedings of the National Academy of Sciences, Early Edition, p. 1 of 6 (2012) (analyzing “well-to-wheels” emissions).¹¹⁶ This study concluded that “CNG-fueled vehicles are not a viable mitigation strategy for climate change.” *Id.* at 2. Converting gasoline-fueled cars to compressed natural gas would make the climate worse for 80 years; converting heavy-duty diesel vehicles to natural gas increases warming for 300 years. *Id.*

4. Accordingly, DOE/FE Cannot Conclude That The Proposal Is Consistent With The Public Interest

As the above demonstrates, information in the record before FERC—including documents administratively noticed by DOE/FE and a study commissioned by DOE/FE to address the very issue of exports—demonstrates that export proposal will have serious adverse environmental impacts. These environmental impacts are themselves contrary to the public interest. Each of these environmental harms also translates into economic damage. If pollution sickens people, or restricts their travel, economic productivity will suffer – as it will, more directly, if clean air and water and adequate waste disposal capacity are not available. Similarly, as landscapes are industrialized, tourism, agricultural, forestry, hunting and angling, and other place-dependent industries will suffer. Thus, DOE/FE must both consider these environmental impacts in and of themselves and monetize them to weigh them against other economic harms in the public interest analysis.

III. Conclusion

Sierra Club therefore moves to intervene, offers the above comments, and protests Sabine Pass’s export proposal for the reasons described above. DOE/FE must withdraw its conditional authorization and DOE/FE cannot grant a final authorization at this time. NEPA requires a thorough assessment of the proposal’s environmental impacts before DOE/FE can approve the project. Now that FERC has refused to consider even the environmental aspects of effects explicitly discussed in DOE/FE’s conditional authorization, DOE/FE cannot rely on FERC’s environmental assessment. Had a proper NEPA analysis been completed, it would have revealed environmental impacts resulting from induced shale gas production, increased coal use in the domestic electricity generation industry, and the liquefaction process itself. These impacts demonstrate that the project is inconsistent with the public interest, and DOE/FE must deny the application.

¹¹⁶ Attached as Exhibit 71, available at <http://www.pnas.org/cgi/doi/10.1073/pnas.1202407109>

Respectfully submitted,

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UNITED STATES OF AMERICA
DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

IN THE MATTER OF)
)
Sabine Pass Liquefaction, LLC) FE DOCKET NO. 10-111-LNG
and Sabine Pass LNG, L.P.)

CERTIFICATE OF SERVICE

I hereby certify that I caused the above documents to be served on the applicant and all others parties in this docket, in accordance with 10 C.F.R. § 590.017, on April 18, 2012.

Dated at San Francisco, CA, this 18th day of April, 2012.



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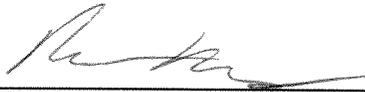
UNITED STATES OF AMERICA
DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

IN THE MATTER OF)
) FE DOCKET NO. 10-111-LNG
Sabine Pass Liquefaction, LLC)
and Sabine Pass LNG, L.P.)

CERTIFIED STATEMENT OF AUTHORIZED REPRESENTATIVE

Pursuant to C.F.R. § 590.103(b), I, Nathan Matthews, hereby certify that I am a duly authorized representative of the Sierra Club, and that I am authorized to sign and file with the Department of Energy, Office of Fossil Energy, on behalf of the Sierra Club, the foregoing documents and in the above captioned proceeding.

Dated at San Francisco, CA, this 18th day of April, 2012.



Nathan Matthews
Associate Attorney
Sierra Club Environmental Law Program
85 Second Street, Second Floor
San Francisco, CA 94105
Telephone: (415) 977-5695
Fax: (415) 977-5793
Email: nathan.matthews@sierraclub.org

UNITED STATES OF AMERICA
DEPARTMENT OF ENERGY
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VERIFICATION

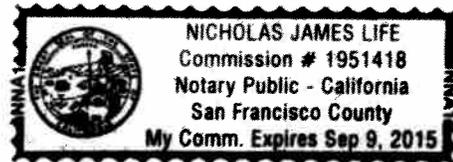
WASHINGTON §
§
DISTRICT OF COLUMBIA §

Pursuant to C.F.R. §590.103(b), Nathan Matthews, being duly sworn, affirms that he is authorized to execute this verification, that he has read the foregoing document, and that facts stated herein are true and correct to the best of his knowledge, information, and belief.



Nathan Matthews
Associate Attorney
Sierra Club Environmental Law Program
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San Francisco, CA 94105
Telephone: (415) 977-5695
Email: nathan.Mattews@sierraclub.org

Subscribed and sworn to before me this 18 day of April, 2012.


Notary Public

My commission expires: 09/09/2015