

April 14, 2016

*Sent via Electronic Mail*

U.S. Bureau of Land Management  
Tres Rios Field Office  
Attn: SUIT SEIS Shale Formation Plan Comment Manager  
29211 Highway 184  
Dolores, Colorado 81323  
Email: [blm\\_co\\_suit\\_seis@blm.gov](mailto:blm_co_suit_seis@blm.gov)

**Re: Scoping Comments – Supplemental Environmental Impact Statement for Shale Formation Oil and Gas Development on the Southern Ute Reservation in La Plata, Montezuma and Archuleta counties, Colorado.**

Dear SUIT SEIS Shale Formation Plan Comment Manager:

San Juan Citizens Alliance, WildEarth Guardians, Oil & Gas Accountability Project, and Center for Biological Diversity (together “Conservation Groups”), submit the following Scoping Comments regarding the Bureau of Land Management (BLM) Tres Rios Field Office (TRFO) Supplemental Environmental Impact Statement (SEIS) for Shale Formation Oil and Gas Development on the Southern Ute Reservation in La Plata, Montezuma and Archuleta counties, Colorado. The SEIS is intended to analyze impacts associated with oil and gas development of shale formations that have never previously been identified.

Founded in 1986, **San Juan Citizens Alliance** (SJCA) organizes people to protect our water and air, our lands, and the character of our rural communities in the San Juan Basin. SJCA has over 600 members; many live within the proposed SEIS project area. SJCA has been active in oil and gas issues in the San Juan Basin since the early 1990s, and has commented on virtually every multi-well drilling program, lease sale, and programmatic environmental review conducted in the region by the federal land management agencies. SJCA’s members live, work, and recreate throughout the San Juan Basin and San Juan Mountains. SJCA’s members’ health and use of this Proposed Action project area is directly impacted by the decisions identified in scoping for the SEIS as presented by the Southern Ute Indian Tribe Growth Fund.

**WildEarth Guardians** protects and restores wildlife, wild places, and wild rivers in the American West. As part of its Climate and Energy Program, Guardians works to advance clean energy and expose the true cost of fossil fuels. Guardians works to protect and restore the San Juan Basin in order to safeguard its cultural heritage, natural values, communities, and open spaces.

**Oil & Gas Accountability Project (OGAP)** is a program of Earthworks, a not for profit organization, with approximately 1,300 members in Colorado. Many of OGAP's members live in southwest Colorado and have oil and gas wells and facilities on or close to their property. Oil and gas development can put the public health and safety of these members at risk: likely harms include drinking water contamination, hydrocarbon and chemical spills on their property, contaminated soil, toxic emissions and noxious odors. OGAP and its members have been actively involved with oil and gas issues in southwest Colorado for nearly twenty years.

The **Center for Biological Diversity** is a non-profit environmental organization with more than 980,000 members and activists, including members who live near and recreate in the areas in southwestern Colorado and on the public lands of the Tres Rios Field office. The Center uses science, policy and law to advocate for the conservation and recovery of species on the brink of extinction and the habitats they need to survive. The Center has and continues to actively advocate for increased protections for species, habitats and the climate in the planning area on lands managed by the Bureau of Land Management. The lands and waters that will be affected by the decision include habitat for many listed, rare, and imperiled species that the Center has worked to protect including the Colorado pikeminnow, humpback chub, bonytail, razorback sucker, and Colorado River cutthroat trout.

Conservation Groups accessed project information solely available on the Southern Ute Indian Tribe Growth Fund website ([www.sugf.com/SEIS/](http://www.sugf.com/SEIS/)) which provides an overview of the proposed project and identifies three lead agencies responsible for the Supplemental Environmental Impact Statement for the Shale Formation Oil and Gas Development: Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA) and SUIT. According to the Southern Ute Indian Tribe Growth Fund website:

The BLM intends to prepare a Supplemental Environmental Impact Statement (SEIS) for Proposed Shale Formation Oil and Gas Development on the Southern Ute Indian Reservation in La Plata, Montezuma and Archuleta Counties, Colorado. The SEIS would supplement the analysis in the Final Environmental Impact Statement (FEIS) Oil and Gas Development on the Southern Ute Indian Reservation (U.S. Department of the Interior [USDI] 2002). The SEIS also incorporates by reference the information from the Programmatic Environmental Assessment (PEA) for 80-Acre Infill Oil and Gas Development on the Southern Ute Indian Reservation (USDI 2009) and the North Carracas Plan of Development Environmental Assessment (EA) (USDI 2013). None of these documents considered development of shale formations. The SEIS would consider a reasonable range of alternatives, including the No Action alternative.

## **Proposed Action**

The Proposed Action consists of the proposed shale development, which would include drilling 1,534 wells on 352 well pads; completion and production of those wells; construction of associated gathering system pipelines, access roads, and other infrastructure (i.e., compressor stations, injection wells, etc.); and interim and final reclamation. Programmatic environmental documents are written to analyze impacts on a broad scale. The exact locations of wells and other facilities associated with the proposed development are not currently known. Impacts resulting from the proposed development will be assessed quantitatively when methodologies and data are available and qualitatively when they are not. Future Applications for Permit to Drill (APDs) and right-of-ways (ROWs) will be subject to site-specific EAs tiered to the SEIS (when required).

The proposed action falls within the Bureau of Indian Affairs' (BIA's), Southern Ute Agency, and the BLM's authority under the Indian Mineral Development Act of 1982 (25 USC 2101 et seq., 25 CFR Part 225). The BIA administers lease activity, while the BLM is responsible for subsurface operation administration of such leases under the authority of the Federal Oil and Gas Royalty Management Act of 1982 (30 USC 1701, 43 CFR Part 3160). The BIA, BLM, and SUIT are the lead agencies.

Three maps were provided by the Southern Ute Southern Ute Indian Tribe Growth Fund website ([www.sugf.com/SEIS/](http://www.sugf.com/SEIS/)) supporting the written description of the Proposed Action to be evaluated in the SEIS: Surface Ownership on the Southern Ute Indian Reservation; Mineral Ownership on the Southern Ute Indian Reservation; and Shale Plays on the Southern Ute Reservation.

A project PowerPoint was also posted to the Southern Ute Southern Ute Indian Tribe Growth Fund website ([www.sugf.com/SEIS/](http://www.sugf.com/SEIS/)) titled, "Public Outreach Meeting, Supplemental Environmental Impact Statement, Shale Formation Oil & Gas Development on the Southern Ute Indian Reservation." The PowerPoint discloses that the majority of the wells would be Mancos Shale Gas (1,430), with 40 Mancos/Niabrara Shale Oil wells, 40 Lewis Shale Gas wells, and 24 Paradox Shale Gas wells. In addition to 352 well pads, the PowerPoint provides estimated disturbance of 117 multi-well fluid management facilities, 83 miles of new roads and 600 miles of new pipelines.

### **I. Procedural Deficiencies with Scoping for SEIS and Need for EIS**

The National Environmental Policy Act ("NEPA"), 42 U.S.C. § 4321 *et seq.*, and its implementing regulations, promulgated by the Council on Environmental Quality ("CEQ"), 40 C.F.R. §§ 1500.1 *et seq.*, is our "basic national charter for the protection of the environment." 40 C.F.R. § 1500.1. The National Environmental Policy Act (40 CFR § 1508) clearly states the following concerning Major Federal actions requiring the preparation of environmental impact statements:

- (a) Agencies shall make sure the proposal which is the subject of an environmental impact statement is properly defined. Agencies shall use the criteria for scope (Sec. 1508.25) to

determine which proposal(s) shall be the subject of a particular statement. Proposals or parts of proposals which are related to each other closely enough to be, in effect, a single course of action shall be evaluated in a single impact statement.

(b) Environmental impact statements may be prepared, and are sometimes required, for broad Federal actions such as the adoption of new agency programs or regulations (Sec. 1508.18). Agencies shall prepare statements on broad actions so that they are relevant to policy and are timed to coincide with meaningful points in agency planning and decisionmaking.

The Council On Environmental Quality (CEQ) is quite clear on providing guidance to lead Federal agencies on avoiding segmenting a proposed action to avoid the application of NEPA, or to avoid a more detailed assessment of the environmental effects of the overall action. The following sections of NEPA discuss scope and include the concepts of connected and cumulative actions under 40 CFR § 1508 (a):

Scope consists of the range of actions, alternatives, and impacts to be considered in an environmental impact statement. The scope of an individual statement may depend on its relationships to other statements (Secs. 1502.20 and 1508.28). To determine the scope of environmental impact statements, agencies shall consider 3 types of actions, 3 types of alternatives, and 3 types of impacts. They include:

(a) Actions (other than unconnected single actions) which may be:

Connected actions, which means that they are closely related and therefore should be discussed in the same impact statement. Actions are connected if they:

- (i) Automatically trigger other actions which may require environmental impact statements.
- (ii) Cannot or will not proceed unless other actions are taken previously or simultaneously.
- (iii) Are interdependent parts of a larger action and depend on the larger action for their justification.

Cumulative actions, which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement.

Similar actions, which when viewed with other reasonably foreseeable or proposed agency actions, have similarities that provide a basis for evaluating their environmental consequences together, such as common timing or geography. An agency may wish to analyze these actions in the same impact statement. It should do so when the best way to assess adequately the combined impacts of similar actions or reasonable alternatives to such actions is to treat them in a single impact statement.

The SEIS has three lead agencies that have a responsibility to provide adequate opportunities for public involvement. National Environmental Policy Act (40 CFR § 1506.6 (a) Public involvement requires agencies to make diligent efforts to involve the public in preparing and implementing their NEPA procedures. The Surface Ownership and Mineral Ownership maps that define the SEIS Proposed Action show significant areas that are not owned by the Southern Ute Indian Tribe. These areas are in proximity to Durango, Pagosa Springs, Mancos and other areas where there are Federal lands (BLM, BIA, Bureau of Reclamation and U.S. Forest Service), and private lands that could be significantly impacted by the SEIS Proposed Action. The only information available on the SEIS is found on the Southern Ute Indian Tribe Growth Fund website ([www.sugf.com/SEIS/](http://www.sugf.com/SEIS/)) where the site states twice that the proposed shale development will occur on the Southern Ute Indian Reservation (underlined for emphasis). This is deceptive to meaningful public involvement where federal and public surface ownership could be impacted by the SEIS independent of lands owned by the Southern Utes. In addition, some of the project area to evaluated in the SEIS is split estate, further necessitating clear definition by the BLM, BIA, and SUIT in scoping the project.

The public notification of the scoping period for the proposed SEIS was both insufficient in scope and tardy in timing. It appears that even the standard BLM protocol for public outreach to “interested parties” was not followed. SJCA received notice of the scoping process through a “re-sent” mailing from SUIT that arrived on April 5, 2016 well after the only public informational meeting scheduled for March 22, 2016 and just 9 days before the scoping deadline. A partner conservation organization also received notice through postal mail that arrived just the day before the March 22, 2016 meeting in Ignacio. Though the TRFO of the BLM is a lead agency in this NEPA process it appears that coordination between BLM, BIA and SUIT was lacking in support of informing the public of the scoping process of this enormous landscape scale proposal.

It appears that the scoping meetings conducted for the SEIS to date in Ignacio on March 15 (Tribal Members) and March 22, 2016 are insufficient to allow impacted communities and the public to adequately understand the Proposed Action. BLM and BIA, as Lead Agencies with SUIT, should conduct additional scoping meetings in at least three more communities (potentially Durango, Mancos and Bayfield) to explain the need for the SEIS and kick off the project on a meaningful manner that enables real public participation. It would be extremely helpful if BLM, BIA and SUIT would commit to providing the documents that the SEIS purports to supplement including the Final Environmental Impact Statement (FEIS) Oil and Gas Development on the Southern Ute Indian Reservation (U.S. Department of the Interior [USDI] 2002), the Programmatic Environmental Assessment (PEA) for 80-Acre Infill Oil and Gas Development on the Southern Ute Indian Reservation (USDI 2009) and the North Carracas Plan of Development Environmental Assessment (EA) (USDI 2013). None of these documents are currently posted to BIA, BLM TRFO or SUIT websites, yet are incorporated by reference by the agencies. In addition, it would be helpful for the public to have access to the 2007 Memorandum of Understanding between the SUI, BLM and BIA which defines the roles and responsibilities of each agency. Give that SUIT is the project proponent to meet a prescribed 2017 or 2018- project

kickoff<sup>1</sup> and also serves as an agency in the NEPA process, it is essential that BLM and BIA roles prepare a legally proficient EIS.

An essential part of scoping is the public's opportunity to assess whether a SEIS is adequate where agencies acknowledge that documents being supplemented do not have any information on shale development now incorporating new horizontal drilling technologies. The Southern Ute Indian Tribe Growth Fund website clearly acknowledges that that the 2002, 2009 and 2013 NEPA documents did not consider development of shale formations, "None of these documents considered development of shale formations." The primary document that the SEIS supplements is the FEIS Oil and Gas Development on the Southern Ute Indian Reservation (U.S. Department of the Interior [USDI] 2002) which analyzed only the western and central portions of the Reservation and focused on conventional, coalbed methane (CBM) and enhanced coalbed methane (ECBM) gas recovery. The Record of Decision (ROD) for the FEIS Oil and Gas Development on the Southern Ute Indian Reservation (U.S. Department of the Interior [USDI] 2002) clearly stated,

Our decision applies only to Southern Ute Tribal and allotted surface and/or mineral estate oil and gas development under BLM's and BIA's fiduciary responsibility to the Tribe and its individual members.<sup>2</sup>

The ROD for the FEIS Oil and Gas Development on the Southern Ute Indian Reservation (U.S. Department of the Interior [USDI] 2002) also disclosed that there was no reasonably foreseeable development of oil and gas in the eastern portion of the Reservation,

An alternative addressing development within the eastern portion of the Reservation was identified. The Tribe has no plans for oil and gas development on the eastern portion of the Reservation. Therefore, this alternative was not carried forward for further analysis.<sup>3</sup>

The ROD for the FEIS Oil and Gas Development on the Southern Ute Indian Reservation (U.S. Department of the Interior [USDI] 2002) discussed regulations as they applied to the proposed project area:

Regulations applicable to SUIT oil and gas activities and enforced by other federal agencies, either directly or through delegation to the states, include: consultation with U.S. Fish and Wildlife Service under the Endangered Species Act regarding threatened, endangered and candidate species; coordination with the U.S. Environmental Protection Agency regarding air and water quality under the Clean Air Act, the Clean Water Act,

---

<sup>1</sup> Toledo, Damon. "Shale Oil Reserves Possibly On the Horizon," The Southern Ute Drum. March 18, 2016.

<sup>2</sup> Final Environmental Impact Statement (FEIS) Oil and Gas Development on the Southern Ute Indian Reservation (U.S. Department of the Interior [USDI] 2002), Record of Decision, CO-SJFO-01-001EIS, October 29, 2002, page 5.

<sup>3</sup> Final Environmental Impact Statement (FEIS) Oil and Gas Development on the Southern Ute Indian Reservation (U.S. Department of the Interior [USDI] 2002), Record of Decision, CO-SJFO-01-001EIS, October 29, 2002, page 7.

and the Safe Drinking Water Act; consultation with the Army Corps of Engineers regarding waters of the U.S.; and consultation with the State of Colorado Historic Preservation Office regarding cultural resources...<sup>4</sup>

In 2009 legal proceedings on the FEIS Oil and Gas Development on the Southern Ute Indian Reservation (U.S. Department of the Interior [USDI] 2002) before the United States District Court for the District of Colorado (Case 1:00-cv-00379-REB-CBS), the project specifically concerned CBM wells, and focused on NEPA and Federal Land Policy and Management Act (FLPMA) claims. In regard to the proposed SEIS, what resonates is the BLM's responsibility to enforce FLPMA (multiple use) provisions on non SUIT parts of the Proposed Project area on federal (public) land but to also recognize that horizontal drilling technologies now present situations in which tribal projects can impact federal or tribal lands, and vice-versa. In addition, NEPA responsibilities (pending TRFO lead preparation of the SEIS) to assess the proposed action must clarify the relationship between SUIT surface and mineral ownership and lands (federal and private) beyond the authority of SUIT to control.

The Programmatic Environmental Assessment (PEA) for 80-Acre Infill Oil and Gas Development on the Southern Ute Indian Reservation (USDI 2009) looked only at 770 CBM wells focusing on the Fruitland Formation. This PEA did not analyze any shale oil and gas development.

The North Carracas Plan of Development EA (USDI 2013) was a 40-well project with a compressor station, water disposal well, roads, pipelines and largely within the San Juan River alluvial valley around and upstream of the Navajo Lake area. This EA does not provide the scope of analysis that provides value to supplement in the context of a programmatic EIS intended to evaluate shale oil and gas development of over 1,500 wells.

Conservation Groups are concerned that the SEIS is insufficient in supplementation of existing environmental documents rather than initiating a new EIS designed to analyze the unique features of horizontally drilled, hydraulically fractured shale wells and associated operation/production in the Project Area. Over the past two years, it has been increasingly recognized that climate change impacts and associated hydrological concerns place the Four Corners region at great risk. Given that the SEIS as planned includes federal (public) lands and private lands and is in proximity to population centers, it is critical that BLM, BIA, and SUIT formulate a proficient approach to analyzing shale oil and gas development on the entire landscape potentially impacted in La Plata, Montezuma and Archuleta counties, Colorado. As such, we respectfully request consideration of a stand alone new EIS with a new air quality analysis/modeling and analysis of Air Quality Related Values (with other Federal and State Agency Cooperation) done for the San Juan Basin airshed complying with Memorandum of Understanding 29704 concerning Federal Agencies (U.S. Department of the Interior, U.S. Department of Agriculture and EPA) Improving Coordination to Support Energy Development and Safeguard Air Quality. In addition, due to valid concerns over groundwater and surface

---

<sup>4</sup> Final Environmental Impact Statement (FEIS) Oil and Gas Development on the Southern Ute Indian Reservation (U.S. Department of the Interior [USDI] 2002), Record of Decision, CO-SJFO-01-001EIS, October 29, 2002, page 9.

water contamination, we request a comprehensive groundwater and surface water analysis as part of the NEPA undertaking.

The project PowerPoint posted to the Southern Ute Southern Ute Indian Tribe Growth Fund website ([www.sugf.com/SEIS/](http://www.sugf.com/SEIS/)) titled, “Public Outreach Meeting, Supplemental Environmental Impact Statement, Shale Formation Oil & Gas Development on the Southern Ute Indian Reservation” claims that the Project Benefits include, “Decreases potential from neighboring private leases draining Tribal mineral estate.”<sup>5</sup> Despite reports that the two Red Willow wells and the Swift Energy wells drilled to shale formations to date were unproductive, it appears that the development of the SEIS on a rapid schedule (for drilling by 2018) is predicated to prevent SUIT minerals from being impacted/drained from private leases. However, this is further complicated by the federal implications of federal leasing/royalties assumed in responsibility by BLM and BIA on lands considered public and valid existing rights held by private landowners in La Plata, Archuleta and Montezuma counties.

As discussed throughout these Scoping Comments, this scoping opportunity is of particular importance now given the mounting impacts and threats to our public lands from the virtually unfettered and cumulative oil and gas development that has occurred in the planning area vicinity to date. Conservation Groups’ comments are focused on these impacts and, specifically, are concerned with impacts to air quality, greenhouse gas (“GHG”) emissions, water resources, human health and livable communities, as well as other multiple use values in the planning area.

## **II. The BLM, BIA and SUIT Must Take a Hard Look at the Direct, Indirect and Cumulative Impacts of Oil and Gas Development on Certain Resource Values in the Planning Area.**

Recognizing that “each person should enjoy a healthful environment,” NEPA ensures that the federal government uses all practicable means to “assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings,” and to “attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences,” among other policies. 43 U.S.C. § 4331(b).

NEPA regulations explain, in 40 C.F.R. §1500.1(c), that:

Ultimately, of course, it is not better documents but better decisions that count. NEPA’s purpose is not to generate paperwork – even excellent paperwork – but to foster excellent action. The NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment.

---

<sup>5</sup> PowerPoint titled, “Public Outreach Meeting, Supplemental Environmental Impact Statement, Shale Formation Oil & Gas Development on the Southern Ute Indian Reservation,” ([www.sugf.com/SEIS/](http://www.sugf.com/SEIS/)), page 17.



Thus, while “NEPA itself does not mandate particular results, but simply prescribes the necessary process,” *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989), agency adherence to NEPA’s action-forcing statutory and regulatory mandates helps federal agencies ensure that they are adhering to NEPA’s noble purpose and policies. *See* 42 U.S.C. §§ 4321, 4331.

NEPA imposes “action forcing procedures ... requir[ing] that agencies take a *hard look* at environmental consequences.” *Methow Valley*, 490 U.S. at 350 (citations omitted) (emphasis added). These “environmental consequences” may be direct, indirect, or cumulative. 40 C.F.R. §§ 1502.16, 1508.7, 1508.8. A cumulative impact – particularly important here – is defined as:

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.

Federal agencies determine whether direct, indirect, or cumulative impacts are significant by accounting for both the “context” and “intensity” of those impacts. 40 C.F.R. § 1508.27. Context “means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality” and “varies with the setting of the proposed action.” 40 C.F.R. § 1508.27(a). Intensity “refers to the severity of the impact” and is evaluated according to several additional elements, including, for example: unique characteristics of the geographic area such as ecologically critical areas; the degree to which the effects are likely to be highly controversial; the degree to which the possible effects are highly uncertain or involve unique or unknown risks; and whether the action has cumulatively significant impacts. *Id.* §§ 1508.27(b).

Furthermore, the Federal Land Policy and Management Act (“FLPMA”), 43 U.S.C. § 1701 *et seq.*, directs that “*the public lands be managed in a manner that will protect the quality of [critical resource] values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use.*” 43 U.S.C. § 1701(a)(8). This substantive mandate requires that the agency not elevate the development of oil and gas resources above other critical resource values in the planning area. To the contrary, FLPMA requires that where oil and gas development would threaten the quality of critical resources, that conservation of these resources should be the preeminent goal. As detailed, below, for several critical resource values in the planning area, the proposed action conflicts with the BLM’s mandate under FLPMA.

**A. An Agency fails to take a “hard look” if it predetermines its NEPA analysis.**

NEPA “requires ... that an agency give a ‘hard look’ to the environmental impact of any project or action it authorizes.” *Morris v. U.S. Nuclear Regulatory Commission*, 598 F.3d 677, 681 (10<sup>th</sup> Cir. 2010). This examination “must be taken objectively and in good faith, not as an

exercise in form over substance, and not as a subterfuge designed to rationalize a decision already made.” *Forest Guardians*, 611 F.3d at 712 (quoting *Metcalf v. Daley*, 214 F.3d 1135, 1142 (9<sup>th</sup> Cir. 2000)); *see also* 40 C.F.R. § 1502.2(g) (“Environmental impact statements shall serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made.”); *id.* § 1502.5 (“The statement shall be prepared early enough so that it can serve practically as an important contribution to the decision-making process and will not be used to rationalize or justify decisions already made.”).

BLM, BIA and SUIT must avoid making a predetermined conclusion, creating an unlevel playing field that benefits oil and gas leasing and drilling at the expense of other multiple use resources. There is a long line of cases that warn agencies against making a predetermined decision with respect to their NEPA analysis. The Tenth Circuit Court of Appeals has cautioned: “[I]f an agency predetermines the NEPA analysis by committing itself to an outcome, the agency likely has failed to take a hard look at the environmental consequences of its actions due to its bias in favor of that outcome and, therefore, has acted arbitrarily and capriciously.” *Forest Guardians*, 611 F.3d at 713 (citing *Davis v. Mineta*, 302 F.3d 1104 (10<sup>th</sup> Cir. 2002)). The Tenth Circuit further stated that “[w]e [have] held that ... predetermination [under NEPA] resulted in an environmental analysis that was tainted with bias” and was therefore not in compliance with the statute. *Id.* (citing *Davis*, 302 F.3d at 1112–13, 1118–26)).

While the threshold for finding agency predetermination is high – “occur[ing] only when an agency *irreversibly and irretrievably* commits itself to a plan of action that is dependent upon the NEPA environmental analysis producing a certain outcome, *before* the agency has completed that environmental analysis,” *Forest Guardians*, 611 F.3d at 714 (emphasis in original) – here, BLM, BIA and SUIT have already minimized scoping opportunities and notification commensurate with the scale of the proposed action to drill over 1,500 shale wells and to rely on supplementation of dated documents that admittedly don’t evaluate shale oil and gas drilling and/or production. At a minimum, this creates an improper “inertial presumption” in favor of committing resources to oil and gas development before knowing the site-specific impacts of oil and gas development. *Natl. Wildlife Fed. v. Morton*, 393 F.Supp 1286, 1292 (D.D.C. 1975).

By reaching, in effect, a predetermined decision – or at least creating a presumption in favor of oil and gas leasing and development – BLM not only violates NEPA but also, by elevating development of oil and gas over other multiple use resources, FLPMA. As the Tenth Circuit has explained:

It is past doubt that the principle of multiple use does not require BLM to prioritize development over other uses... Development is a *possible* use, which BLM must weigh against other possible uses – including conservation to protect environmental values, which are best assessed through the NEPA process.

*New Mexico ex rel. Richardson v. Bureau of Land Management*, 565 F.3d 683, 710 (10<sup>th</sup> Cir. 2009). Any indication of BLM, BIA and SUIT presupposition of outcome is a direct affront to both NEPA as it portions of the proposed project area pertains to public land and cannot be sustained. In addition, as both the project proponent and a NEPA lead agency, SUIT must not be allowed to predetermine the outcome of the NEPA analysis.

**B. Because an irretrievable commitment of resources will occur at the SEIS stage, BLM, BIA and SUIT must consider impacts now.**

BLM, BIA and SUIT are embarking on this SEIS as programmatic. The Southern Ute Indian Tribe Growth Fund website states:

Programmatic environmental documents are written to analyze impacts on a broad scale. The exact locations of wells and other facilities associated with the proposed development are not currently known. Impacts resulting from the proposed development will be assessed quantitatively when methodologies and data are available and qualitatively when they are not. Future Applications for Permit to Drill (APDs) and right-of-ways (ROWs) will be subject to site-specific EAs tiered to the SEIS (when required).

Despite the idea that specific components of the shale oil and gas development will undergo analysis later (quantitatively and qualitatively) BLM, BIA, and SUIT must adequately compile analysis of shale oil and gas impacts now in a comprehensive, meaningful manner that takes a “hard look” at impacts to resources. In addition, it is unclear if this SEIS intends to act as a vehicle for TRFO (in conjunction with Resource Management Planning) to pursue more new leases for oil and gas in the proposed SEIS project area given that new technologies now allow shale oil and gas reserves to be accessed in areas thought to not hold recoverable resources.

BLM has previously relied on *Park County Resource Council v. U.S. Department of Agriculture*, 817 F.2d 609 (10<sup>th</sup> Cir. 1987), to support its contention that site-specific NEPA analysis is not required until the APD stage. Further, *Park County* cannot be understood in a vacuum; as the Tenth Circuit more recently explained:

[T]here is no bright line rule that site-specific analysis may wait until the APD stage. Instead, the inquiry is necessarily contextual. Looking to the standards set out by regulation and by statute, assessment of all ‘reasonably foreseeable’ impacts must occur at the earliest practicable point, and must take place before an ‘irretrievable commitment of resources’ is made. 42 U.S.C. § 4332(2)(C)(v); *Pennaco Energy v. U.S. Dept. of Interior*, 377 F.3d 1147, 1160 (10<sup>th</sup> Cir. 2004); *Kern v. U.S. Bureau of Land Management*, 284 F.3d 1062, 1072 (9<sup>th</sup> Cir. 2002); 40 C.F.R. §§ 1501.2, 1502.22. Each of these inquiries is tied to the existing environmental circumstances, not to the formalities of agency procedures. Thus, applying them necessarily requires a fact-specific inquiry.

*New Mexico ex rel. Richardson*, 565 F.3d at 717-18. The Court has unambiguously stated that “[t]he operative inquiry [is] simply whether all foreseeable impacts of leasing [are] taken into account before leasing [can] proceed.” *Id.* at 717.

Indeed, in *Pennaco Energy*, the Court found: “A plan-level EIS for the area failed to address the possibility of CBM development, and a later EIS was prepared only after the leasing stage, and thus ‘did not consider whether leases should have been issued in the first place.’” *New*

*Mexico*, 565 F. 3d. at 717 (citing *Pennaco Energy*, 377 F.3d at 1152). Moreover, the Court held that “[b]ecause the issuance of leases gave lessees a right to surface use, the failure to analyze CBM development impacts before the leasing stage foreclosed NEPA analysis from affecting the agency’s decision.” *Id.* (citing *Pennaco Energy*, 377 F.3d at 1160).

Unlike *Park County* where site-specific impacts were difficult to anticipate, here, like in *Pennaco Energy*, the impacts of 1,534 wells, 352 well pads, 117 multi-well fluid management facilities, 83 miles of new roads and 600 miles of new pipelines are reasonably foreseeable and their impacts should be readily understandable and specifically analyzed in the EIS level analysis to be conducted by BLM, BIA and SUIT.

Moreover, irrespective of BLM, BIA and SUIT’s ultimate conclusion with regard to stipulations, an irretrievable commitment of resources will be conferred at the SEIS or EIS stage; existing oil and gas leases confer “the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove and dispose of all the leased resource in a leasehold.” 40 C.F.R. § 3101.1-2; *Sierra Club v. Hodel*, 848 F.2d 1068, 1093 (10th Cir. 1988) (agencies are to perform hard look NEPA analysis “before committing themselves irretrievably to a given course of action so that the action can be shaped to account for environmental values”).

### **C. The BLM, BIA and SUIT must take a “hard look” at impacts to air quality.**

The BLM, BIA and SUIT must take a hard look at the air quality impacts from oil and gas development in the planning area. Much of air pollution from oil and gas development and operations, which is specifically discussed, below, also degrades visibility. Section 169A of the Clean Air Act (“CAA”), 42, U.S.C. § 7401 *et seq.* (1970) sets forth a national goal for visibility, which is the “prevention of any future, and the remedying of any existing, impairment of visibility in Class I areas which impairment results from manmade air pollution.” Congress adopted the visibility provisions in the CAA to protect visibility in “areas of great scenic importance.” H.R. Rep. No. 294, 95<sup>th</sup> Cong. 1<sup>st</sup> Sess. at 205 (1977). In promulgating its Regional Haze Regulations, 64 Fed. Reg. 35,714 (July 1, 1999), the U.S. Environmental Protection Agency (“EPA”) provided:

Regional haze is visibility impairment that is produced by a multitude of sources and activities which emit fine particles and their precursors and which are located across a broad geographic area. Twenty years ago, when initially adopting the visibility protection provisions of the CAA, Congress specifically recognized that the “visibility problem is caused primarily by emission into the atmosphere of SO<sub>2</sub>, oxides of nitrogen, and particulate matter, especially fine particulate matter, from inadequate[ly] controlled sources.” H.R. Rep. No. 95-294 at 204 (1977). The fine particulate matter (PM) (e.g., sulfates, nitrates, organic carbon, elemental carbon, and soil dust) that impairs visibility by scattering and absorbing light can cause serious health effects and mortality in humans, and contribute to environmental effects such as acid deposition and eutrophication.

The visibility protection program under sections 169A, 169B, and 110(a)(2)(J) of the CAA is designed to protect Class I areas from impairment due to manmade air pollution. The

current regulatory program addresses visibility impairment in these areas that is “reasonably attributable” to a specific source or small group of sources, such as, here, air pollution resulting from oil and gas development and operations authorized by the LRMP. *See* 64 Fed. Reg. 35,714.

Moreover, EPA finds the visibility protection provisions of the CAA to be quite broad. Although EPA is addressing visibility protection in phases, the national visibility goal in section 169A calls for addressing visibility impairment generally, including regional haze. *See e.g., State of Maine v. Thomas*, 874 F.2d 883, 885 (1<sup>st</sup> Cir. 1989) (“EPA’s mandate to control the vexing problem of regional haze emanates directly from the CAA, which ‘declares as a national goal the prevention of any future, and the remedying of any existing, impairment of visibility in Class I areas which impairment results from manmade air pollution.’”) (citation omitted).

Here, there are numerous Class I areas within or near the project area that may be impacted by the proposed development, including Weminuche Wilderness, La Garita Wilderness, South San Juan Wilderness, Great Sand Dunes National Park, and Mesa Verde National Park in Colorado.

In addition to impacts from the proposed development, cumulative air quality impacts from sources in and around the proposed development area may result in serious impairments. For example, there is considerable oil and gas development already taking place in the San Juan Basin, with approximately 23,000 active oil and gas wells, as well as significant emissions from coal-fired power plants at San Juan Generating Station and the Four Corners Power Plant. The 2014 identification of the Four Corners region as a “methane hotspot” raises the profile on existing oil and gas development (including dewatering of CBM wells throughout the SUIT Reservation area and in the Animas River fairway) and methane seepage from outcropping geological formations (including Fruitland and Mancos).

The current status of air quality in an area is a fundamental consideration for the SEIS analysis. Background monitored concentrations of all pollutants should be reviewed. Given the increasing development in the area, there may be higher concentrations that should be reflected. In particular, elevated monitored levels for the 8-hour ozone National Ambient Air Quality Standard (“NAAQS”) in this area in recent years are very concerning. Exposure to ozone is a serious concern as it can cause or exacerbate respiratory health problems, including shortness of breath, asthma, chest pain and coughing, decreased lung function and even long-term lung damage, as discussed in greater detail below. *See also*, EPA’s National Ambient Air Quality Standards for Particulates and Ozone, 62 FR 38,856 (July 18, 1997). According to a recent report by the National Research Council (“NRC”): “short-term exposure to current levels of ozone in many areas is likely to contribute to premature deaths.”<sup>6</sup> Even ozone concentrations at levels as low as 60 ppb can be considered harmful to human health and the agencies should consider this when evaluating the air impacts that would result from developing over 1,500 wells. The volatile organic compounds (VOCs) from oil and gas development are primary ingredients in

---

<sup>6</sup> National Research Council, *Link Between Ozone Air Pollution and Premature Death Confirmed*, (April 2008), available at: <http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=12198>.

interacting with nitrogen oxides (NO<sub>x</sub>) to create a secondary chemical reaction to create ozone.

Elevated ozone concentrations have been recorded in recent years at eight monitors in the Four Corners Area. For example, the background value given for Mesa Verde is 142 µg/m<sup>3</sup>, which is just under the NAAQS.<sup>7</sup> Thus, the increased oil and gas development that will take place under the proposed action would be an important contributor to the ozone problem in the area. There is no room for growth in emissions that contribute to these harmful levels of ozone pollution in the area – namely, NO<sub>x</sub> and VOCs. Any increase in emissions of ozone precursors will exacerbate the negative health effects of ozone in the region, as discussed below, and is almost certain to threaten the area's compliance with EPA's ozone standard.

Additionally, PM<sub>2.5</sub> is another potential area of major health impacts in the area. PM<sub>2.5</sub> can become lodged deep in the lungs or can enter the blood stream, worsening the health of asthmatics and even causing premature death in people with heart and lung disease. Even PM<sub>2.5</sub> concentrations lower than the current NAAQS are a concern for human health. While background PM<sub>2.5</sub> values are not at the level of the NAAQS currently, it is likely that those levels will increase with continued development in the area. Elevated wintertime concentrations could become an issue as they have in other areas of concentrated oil and gas development in the West, such as in the Uinta Basin in Utah.<sup>8</sup>

Also critical to the BLM, BIA and SUIT's analysis of air quality impacts is the relationship to human health. Logically, the required air quality mitigation measures would have a positive relationship to human health, but poor baseline air quality conditions due to direct, indirect and cumulative impacts in the planning area warrants an independent hard look analysis at human health; and, moreover, such analysis is required by NEPA and CEQ implementing regulations.

Research indicates a strong correlation between oil and gas development and increased ozone concentrations – particularly in the summer when warm, stagnant conditions yield an increase in O<sub>3</sub> from oil and gas emissions.<sup>9</sup> Particularly in areas of significant existing oil and gas development – such as the San Juan Basin in the Four Corners region, which was the focus of research, here – summertime “*peak incremental O<sub>3</sub> concentration of 10 ppb*” have been simulated. *Id.* at 1118. This study indicates a “clear potential for oil and gas development to negatively affect regional O<sub>3</sub> concentrations in the western United States, including several treasured national parks and wilderness areas in the Four Corners region – particularly Mesa

---

<sup>7</sup> The 75 ppb 8-hour ozone standard of 75 ppb translates to 150 µg/m<sup>3</sup>.

<sup>8</sup> Several very high values of PM<sub>2.5</sub> were recorded in Vernal, Utah starting in 2007, including six exceedances of the 24-hour PM<sub>2.5</sub> NAAQS and a maximum 24-hour average PM<sub>2.5</sub> concentration of 63 µg/m<sup>3</sup>. In 2009, there were three recorded exceedances of the 24-hour average PM<sub>2.5</sub> NAAQS in Roosevelt, Utah with 24-hour average concentrations reaching 42 µg/m<sup>3</sup> and four recorded exceedances in Vernal with 24-hour average concentrations as high as 60.9 µg/m<sup>3</sup>.

<sup>9</sup> *Marco A Rodriguez, et al., Regional Impacts of Oil and Gas Development on Ozone Formation in the Western United States, JOURNAL OF AIR & WASTE MANAGEMENT ASSOCIATION (Sept. 2009).*

Verde and the Weminuche Wilderness. “It is likely that accelerated energy development in this part of the country will worsen the existing problem.”<sup>10</sup> Additionally, oil and gas production in the mountain west has recently been linked to *winter* ozone levels that greatly exceed the National Ambient Air Quality Standards (“NAAQS”).<sup>11</sup>

As the Endocrine Disruption Exchange has noted:

In addition to the land and water contamination issues, at each stage of production and delivery tons of toxic volatile compounds, including benzene, toluene, ethylbenzene, xylene, etc., and fugitive natural gas (methane), escape and mix with nitrogen oxides from the exhaust of diesel-driven, mobile and stationary equipment to produce ground-level ozone. Ozone combined with particulate matter less than 2.5 microns produces smog (haze). Gas field produced ozone has created a serious air pollution problem similar to that found in large urban areas, and can spread up to 200 miles beyond the immediate region where gas is being produced. Ozone not only causes irreversible damage to the lungs, it is equally damaging to conifers, aspen, forage, alfalfa, and other crops commonly grown in the West. Adding to this is the dust created by fleets of diesel-driven water trucks working around the clock hauling the constantly accumulating condensate water from well pads to central evaporation pits.<sup>12</sup>

Increases in ground-level ozone not only impact regional haze and visibility, but can also result in dramatic impacts to human health. According to the EPA:

Breathing ground-level ozone can result in a number of health effects that are observed in broad segments of the population. Some of these effects include:

- Induction of respiratory symptoms
- Decrements in lung function
- Inflammation of airways

Respiratory symptoms can include:

---

<sup>10</sup> See Rodriguez at 1118.

<sup>11</sup> See Gail Tonnesen and Richard Payton, EPA Region 8. *Winter Ozone Formation: Results from the Wyoming Upper Green River Basin Studies and Plans for the 2012, Uintah Basin Study* (seminar abstract) (Jan. 2012), available at: <http://www.esrl.noaa.gov/csd/seminars/2012/TonnesenPayton.html> (citing, *inter alia*, Schnell, et. al., *Rapid photochemical production ozone at high concentrations in a rural site during winter*, 2 Nature Geosci. 120-122 (2009).

<sup>12</sup> The Endocrine Disruption Exchange. Undated. *Chemicals In Natural Gas Operations: Health Effects Spreadsheet and Summary*, available at: <http://www.endocrinedisruption.com/chemicals.multistate.php>.

- Coughing
- Throat irritation
- Pain, burning, or discomfort in the chest when taking a deep breath
- Chest tightness, wheezing, or shortness of breath

In addition to these effects, evidence from observational studies strongly indicates that higher daily ozone concentrations are associated with increased asthma attacks, increased hospital admissions, increased daily mortality, and other markers of morbidity. The consistency and coherence of the evidence for effects upon asthmatics suggests that ozone can make asthma symptoms worse and can increase sensitivity to asthma triggers.<sup>13</sup>

*Oil and gas development* is one of the largest sources of VOCs, ozone, and sulfur dioxide emissions in the United States. *The relationship between air quality and human health* must be analyzed in the NEPA analysis and warrants a stand alone Air Quality analysis with National Park Service, National Oceanic and Atmospheric Administration and state agency (including Colorado Department of Public Health and Environment) input. In addition, since SUI has air quality delegated authority under the Clean Air Act, it is important that SUI, BLM and BIA raise the profile to accurately assess current air quality impacts as well as those projected by adding the 1,534 new shale wells and ancillary production facilities (compressors and undefined 117 multi-well fluid management facilities) to the airshed.

The SEIS or EIS for the Shale oil and gas development must aggregate oil and gas facilities to accurately assess impacts. “The agency must examine the relevant data and articulate a satisfactory explanation for its action including a ‘rational connection between the facts found and the choice made.’” *Motor Vehicle Mfrs.*, 463 U.S. at 43 (1983). The EPA has issued clarifying guidance regarding the issue of aggregating emissions from oil and gas operations under the Prevention of Significant Deterioration (“PSD”) and Title V programs of the federal Clean Air Act. On September 22, 2009, the agency reversed a 2007 memo that discouraged states from aggregating emissions. Subsequently, on October 8, 2009, EPA Administrator Lisa Jackson issued a ruling on a Title V petition holding that states must assess whether oil and natural gas operations should be aggregated in accordance with longstanding EPA policies governing PSD and Title V permitting. Although the ruling objected to the issuance of a Title V permit issued for a natural gas compressor station in Colorado and provides clear guidance that states must conduct more rigorous assessments of oil and gas operations to assure compliance with both PSD and Title V.

We urge the BLM, BIA and SUI to follow the EPA’s guidance and ensure that emissions from oil and gas operations associated with SEIS are appropriately aggregated to ensure compliance with PSD and Title V. Such action will significantly enhance public health as well as avoid more difficult choices that could come with future non-attainment designations or other significant air quality issues.

---

<sup>13</sup> EPA, *Health Effects of Ozone in the General Population*, available at: <http://www.epa.gov/apti/ozonehealth/population.html>.



The issue of aggregation is extremely important to ensuring long-term protection and restoration of air quality, public health, and the environment across the United States the recognition that increased oil and gas development has had significant impacts on both rural and urban air quality. Rising ozone levels, regional haze, and air toxics concerns are but a few. Many of these observed impacts are linked to the fact that oil and gas operations are individually small, yet collectively large (cumulative), sources of air pollution. Aggregation provides an important opportunity to more accurately recognize integrated source operations under the Clean Air Act and ensure that oil and gas operations are regulated on a cumulative basis under PSD and Title V. In particular, it provides an opportunity to determine whether individually small sources of air pollution should be aggregated together as larger sources. To this end, the EPA's recent guidance and Title V petition ruling provide an important opportunity to immediately begin assessing whether and to what extent pollutant emitting activities related to oil and gas development should be aggregated as single sources in accordance with the "fundamental criteria for making source determinations[.]"

While we recognize that the question of whether to aggregate two or more pollutant emitting activities into a single major stationary source under PSD and Title V is a case-by-case determination, we urge BLM, BIA and SUIT to conduct a full analysis (with appropriate Cooperating Agencies including EPA and National Park Service) for oil and gas operations for the SEIS:

- An evaluation of system maps for oil and gas operations, which shows all emission sources owned or operated by individual companies in producing oil and gas fields, as well as the proposed project components from drilling through production phases;
- A determination as to whether and to what extent the various pollution emitting activities are contiguous or adjacent to, and under common control with, permitted or proposed to be permitted facilities;
- An assessment of flow diagrams that show movement of oil and gas from the well sites to processing facilities so that you may determine the nature of the sources' emissions and determine the interdependency of operations; and
- An analysis of business information regarding the nature of control of operations to determine whether various pollution emitting activity should be considered under common control for purposes of making the source determination.

This guidance was explicitly enumerated by Administrator Jackson in her October 8, 2009 Title V petition ruling and is a reasonable basis upon which to analyze source determinations under the Clean Air Act for oil and gas operations.

Natural gas systems including individual natural gas wells, gathering systems, compressors, and processing plants constitute an aggregate action that requires commensurate permitting review under the Clean Air Act.

## 1. New Ozone Standards

Ozone has long been recognized to cause adverse health effects. Short term exposure to ozone causes multiple negative respiratory effects, from inflammation of airways to more serious respiratory effects that can lead to use of medication, absences from school and work, hospital admission, emergency room visits, and chronic obstructive pulmonary disease (“COPD”). Respiratory harm from ozone exposure, even at current standards, can harm healthy people. The impacts are much more serious for people with lung disease, such as asthma. Long-term exposure to elevated levels of ozone results in numerous negative harmful effects, such as permanent lung damage and abnormal lung development in children. Long-term exposure may also increase risk of death from respiratory problems. Short- and long-term exposure to elevated levels of ozone can also harm people’s hearts and cardiovascular system. *See* 79 Fed. 75234-311.

On December 17, 2014, EPA published a proposal to revise NAAQS for ozone to 65 to 70 parts per billion (ppb) from the current 75 ppb. National Ambient Air Quality Standards for Ozone, 79 Fed. Reg. 75234 (Dec. 17, 2014). This decision was driven by significant recent scientific evidence that the current standard of 75 ppb does not adequately protect public health and that ozone concentrations as low as 72 ppb can cause respiratory harm to young, healthy adults following exposure for less than eight hours. *Id.* at 75249-311 (citing controlled human exposure studies documenting adverse effects to lung function from ozone concentrations of 60 ppb and 72 ppb and epidemiologic panel studies documenting short- and long-term respiratory harms in cities that meet the 75 ppb ozone standard).<sup>14</sup> Recent studies have also documented decreased lung functioning and airway inflammation in young, healthy adults at ozone concentrations as low as 60 ppb; these effects, if repeated, can lead to more serious respiratory impairments. *Id.* at 75280, 75305.

Studies have documented “significant associations with respiratory emergency department visits with children and adults” in places that met the current standard of 75 ppb, but would not have met the proposed standards of 65-70 ppb. *Id.* at 75283-85, 75307 (citing Mar and Koenig, 2009; Dales et al., 2006). The existing standard is plainly insufficient to protect children with asthma and members of other sensitive groups. *Id.* at 75285-87. These impacts will be exacerbated by the worsening impacts of climate change. *Id.* at 75242.

In short, the best science shows that the 75 ppb standard is inadequate to protect public health: “the respiratory effects experienced following exposures to O<sub>3</sub> concentrations lower than 75 ppb could be adverse to some individuals, particularly if experienced by members of at risk populations (e.g., people with asthma, children).” *Id.* at 75280.

Revision of the ozone standard from 75 ppb to 65 or 70 ppb is expected to lead to “meaningful reductions in mean premature mortality.” *Id.* at 75308. The Clean Air Scientific Advisory Committee (CASAC) has noted that even a reduced standard of 70 ppb may not be

---

<sup>14</sup> Brown et al., 2008; Kim et al., 2011; Schelegle et al., 2009; Adams 2002; Adams 2008; Brunekreef et al., 1994; Spektor et al., 1988a; Ulmer et al., 1997; Gielen et al., 1997; Mar and Koenig, 2009.

sufficient to protect public health with an adequate margin of safety, and that a standard as low as 60 ppb would be scientifically justified. *Id.* at 75309-10. CASAC concluded that adverse respiratory effects “almost certainly occur” at lower levels for potentially at risk populations, such as children, the elderly, and people with asthma, people who are active or work outdoors, and people with lung diseases such as COPD. *Id.* at 75305. Thus, a lower level is necessary in order to protect the broader population. *Id.*

NEPA imposes on federal agencies a continuing duty to supplement draft or final environmental impact statements in response to significant new circumstances or information relevant to environmental concerns and bearing on the proposed action. *Idaho Sporting Cong., Inc. v. Alexander*, 222 F.3d 562, 566 n.2 (9th Cir. 2000); 40 C.F.R. § 1502.9(c)(1)(i). Here, EPA’s proposal to revise ozone standards, as well as the science supporting the revision, constitute new circumstances and information, which BLM, BIA and SUIT must take account of in its SEIS. EPA’s proposed revision of the ozone NAAQS and the abundant science supporting the proposal plainly demonstrate that the current NAAQS are not sufficient to protect public health.

## **2. The BLM, BIA and SUIT must take a “hard look” at climate change.**

If we are to stem the impacts of climate change and manage for sustainable ecosystems, not only must the BLM, BIA and SUIT take a hard look at greenhouse gas (“GHG”) emissions from the proposed development, but the decision must be reflective of the challenges we face.

The EPA has determined that human emissions of greenhouse gases are causing global warming that is harmful to human health and welfare. *See* 74 Fed. Reg. 66,496 (Dec. 15, 2009), *Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act*. The D.C. Circuit has upheld this decision as supported by the vast body of scientific evidence on the subject. *See Coal. for Responsible Regulation, Inc. v. E.P.A.*, 684 F.3d 102, 120-22 (D.C. Cir. 2012). Indeed, EPA could not have found otherwise, as virtually every climatologist in the world accepts the legitimacy of global warming and the fact that human activity has resulted in atmospheric warming and planetary climate change.<sup>15</sup> The world’s leading minds and most respected institutions – guided by increasingly clear science and statistical evidence – agree that dramatic action is necessary to avoid planetary disaster.<sup>16</sup> GHG

---

<sup>15</sup> *See, e.g., See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *The Science of Climate Change* (1995); U.S. Climate Change Science Program, *Abrupt Climate Change* (Dec. 2008); James Hansen, et. al., *Global Surface Temperature Change*, REVIEWS OF GEOPHYSICS, 48, RG4004 (June 2010); *see also*, Richard A. Muller, *Conversion of a Climate Change Skeptic*, NEW YORK TIMES, July 28, 2012 (citing Richard A. Muller, et. al., *A New Estimate of the Average Earth Surface Temperature, Spanning 1753 to 2011*; Richard A. Muller, et. al., *Decadal Variations in the Global Atmospheric Land Temperatures*).

<sup>16</sup> *See, e.g.,* Rob Atkinson, et. al., *Climate Pragmatism: Innovation, Resilience, and No Regrets* (July 2011); Veerabhadran Ramanathan, et. al., *The Copenhagen Accord for Limiting Global Warming: Criteria, Constraints, and Available Avenues* (Feb. 2010); UNITED NATIONS, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Climate Change 2007: Synthesis Report*

concentrations have been steadily increasing over the past century,<sup>17</sup> and our insatiable consumption of fossil fuels is pushing the world to a tipping point where, once reached, catastrophic change will be unavoidable.<sup>18</sup> In fact, the impacts from climate change are already being experienced, with drought and extreme weather events becoming increasingly common.<sup>19</sup>

Renowned NASA climatologist, Dr. James Hansen, provides the analogy of loaded dice – suggesting that there still exists some variability, but that climate change is making these extreme events ever more common.<sup>20</sup> In turn, climatic change and GHG emissions are having dramatic impacts on plant and animal species and habitat, threatening both human and species resiliency and the ability to adapt to these changes.<sup>21</sup> According to experts at the Government

---

(2007); A.P. Sokolov, et. al., *Probabilistic Forecast for Twenty-First-Century Climate Based on Uncertainties in Emissions (without Policy) and Climate Parameters*, MASSACHUSETTS INSTITUTE OF TECHNOLOGY (MIT) (Oct. 2009); UNITED NATIONS, FRAMEWORK CONVENTION ON CLIMATE CHANGE, *Report of the Conference of the Parties* (Dec. 2011); Bill McKibben, *Global Warming's Terrifying New Math*, ROLLING STONE, July 19, 2012; Elizabeth Muller, *250 Years of Global Warming*, BERKLEY EARTH, July 29, 2012; Marika M. Holland, et. al., *Future abrupt reductions in summer Arctic sea ice*, *Geophysical Research Letters*, Vol. 33, L23503 (2006).

<sup>17</sup> See Randy Strait, et. al., *Final Colorado Greenhouse Gas Inventory and Reference Case Projections: 1990-2020*, CENTER FOR CLIMATE STRATEGIES (Oct. 2007); Robin Segall et. al., *Upstream Oil and Gas Emissions Measurement Project*, U.S. ENVIRONMENTAL PROTECTION AGENCY; Lee Gribovicz, *Analysis of States' and EPA Oil & Gas Air Emissions Control Requirements for Selected Basins in the Western United States*, WESTERN REGIONAL AIR PARTNERSHIP (Nov. 2011).

<sup>18</sup> See, e.g., James Hansen, *Tipping Point: Perspective of a Climatologist*, STATE OF THE WILD 2008-2009; GLOBAL CARBON PROJECT, *A framework for Internationally Co-ordinated Research on the Global Carbon Cycle*, ESSP Report No. 1; INTERNATIONAL ENERGY AGENCY, *CO<sub>2</sub> Emissions from Fuel Combustion, Highlights 2011*; GLOBAL CARBON PROJECT, *10 Years of Advancing Knowledge on the Global Carbon Cycle and its Management*; Malte Meinshausen, et. al., *Greenhouse-gas emission targets for limiting global warming to 2° C*, NATURE, Vol. 458, April 30, 2009.

<sup>19</sup> See, e.g., UNITED NATIONS, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* (2011); Aiguo Dai, *Increasing drought under global warming in observations and models*, NATURE: CLIMATE CHANGE (Aug. 2012); Stephen Saunders, et. al., *Hotter and Drier: The West's Changed Climate* (March 2008).

<sup>20</sup> See, James Hansen, et. al., *Climate Variability and Climate Change: The New Climate Dice* (Nov. 2011); James Hansen, et. al., *Perception of Climate Change* (March 2012); James Hansen, et. al., *Increasing Climate Extremes and the New Climate Dice* (Aug. 2012).

<sup>21</sup> See Fitzgerald Booker, et. al., *The Ozone Component of Climate Change: Potential Effects on Agriculture and Horticultural Plant Yield, Product Quality and Interactions with Invasive*

Accountability Office (“GAO”), federal land and water resources are vulnerable to a wide range of effects from climate change, some of which are already occurring. These effects include, among others, “(1) physical effects, such as droughts, floods, glacial melting, and sea level rise; (2) biological effects, such as increases in insect and disease infestations, shifts in species distribution, and changes in the timing of natural events; and (3) economic and social effects, such as adverse impacts on tourism, infrastructure, fishing, and other resource uses.”<sup>22</sup>

Despite the strength of these findings, the Department of the Interior (of which BLM and BIA re agencies of) has historically failed to take serious action to address impacts. This type of dismissive approach fails to satisfy the guidance outlined in Department of the Interior Secretarial Order 3226, discussed below, or the requirements of NEPA. “Reasonable forecasting and speculation is ... implicit in NEPA, and we must reject any attempt by agencies to shirk their responsibilities under NEPA by labelling any and all discussion of future environmental effects as ‘crystal ball inquiry.’” *Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1246 n.9 (9<sup>th</sup> Cir. 1984 (quoting *Scientists’ Inst. for Pub. Info., Inc. v. Atomic Energy Comm.*, 481 F.2d 1079, 1092 (D.C. Cir. 1973)).

As noted above, NEPA imposes “action forcing procedures ... requir[ing] that agencies take a *hard look* at environmental consequences.” *Methow Valley*, 490 U.S. at 350 (citations omitted) (emphasis added). These “environmental consequences” may be direct, indirect, or cumulative. 40 C.F.R. §§ 1502.16, 1508.7, 1508.8. BLM and BIA are required to take a hard look at those impacts as they relate to agency actions. “Energy-related activities contribute 70% of global GHG emissions; oil and gas together represent 60% of those energy-related emissions through their extraction, processing and subsequent combustion.”<sup>23</sup> Even if science cannot isolate each additional oil or gas well’s contribution to these overall emissions, this does not obviate BLM, BIA and SUIT’s responsibilities (as Lead Agencies on this NEPA undertaking) to consider oil and gas development in the action area from the cumulative impacts of the oil and gas sector. In other words, the Lead agencies cannot ignore the larger relationship that oil and gas management decisions have to the broader climate crisis that we face. Here, the BLM, BIA and SUIT’s analysis must include the full scope of GHG emissions. *See Neighbors of Cuddy Mountain v. U.S. Forest Service*, 137 F.3d 1372, 1379 (9<sup>th</sup> Cir. 1998) (“To ‘consider’ cumulative effects, some quantified or detailed information is required. Without such information, neither

---

*Species*, J. INTEGR. PLANT BIOL. 51(4), 337-351 (2009); Peter Reich, *Quantifying plant response to ozone: a unifying theory*, TREE PHYSIOLOGY 3, 63-91 (1987).

<sup>22</sup> GAO Report, *Climate Change: Agencies Should Develop Guidance for Addressing the Effects on Federal Land and Water Resources* (2007); see also Committee on Environment and Natural Resources, National Science and Technology Council, *Scientific Assessment of the Effects of Global Climate Change on the United States* (2008); Melanie Lenart, et. al. *Global Warming in the Southwest: Projections, Observations, and Impacts* (2007) (describing impacts from temperature rise, drought, floods and impacts to water supply on the southwest).

<sup>23</sup> International Investors Group on Climate Change, *Global Climate Disclosure Framework for Oil and Gas Companies*.

the courts nor the public, in reviewing the [agency's] decisions, can be assured that the [agency] provided the hard look that it is required to provide.”). If we are to stem climate disaster – the impacts of which we are already experiencing – the agency’s decisionmaking must be reflective of this reality and plan accordingly.

BLM is, at the end of the day, responsible for the management of 700 million acres of federal onshore subsurface minerals.<sup>24</sup> Indeed, “the ultimate downstream GHG emissions from fossil fuel extraction from federal lands and waters by private leaseholders could have accounted for approximately 23% of total U.S. GHG emissions and 27% of all energy-related GHG emissions.”<sup>25</sup> This suggests that “ultimate GHG emissions from fossil fuels extracted from federal lands and waters by private leaseholders in 2010 could be more than 20-times larger than the estimate reported in the CEQ inventory, [which estimates total federal emissions from agencies’ operations to be 66.4 million metric tons]. Overall, ultimate downstream GHG emissions resulting from fossil fuel extraction from federal lands and waters by private leaseholders in 2010 are estimated to total 1,551 [million metric tons of CO<sub>2</sub> equivalent (“MMTCO<sub>2</sub>e”)].” *Id.* In 2010, the GAO estimated that BLM could eliminate up to 40% of methane emissions from federally authorized oil and natural gas development, the equivalent of eliminating 126 Bcf or 46.3 MMTCO<sub>2</sub>e of GHG pollution annually and equivalent to roughly 13 coal-fired power plants.<sup>26</sup> To suggest that the agency does not, here, have to account for GHG pollution from oil and gas development would be to suggest that the collective 700 million acres of subsurface mineral estate is not relevant to protecting against climate change. This sort of flawed, reductive thinking would be problematic, and contradicted by the agency’s very management framework that provides a place-based lens to account for specific pollution sources to ensure that the broader public interest is protected. Therefore, even though climate change emissions from the proposed action may look minor when viewed in isolation, when considered cumulatively with all of the other GHG emissions from BLM-managed land, they become significant and cannot be ignored.

---

<sup>24</sup> See DOI-BLM, *Mineral and Surface Acreage Managed By BLM*, available at: [http://www.blm.gov/wo/st/en/info/About\\_BLM/subsurface.html](http://www.blm.gov/wo/st/en/info/About_BLM/subsurface.html).

<sup>25</sup> Stratus Consulting, prepared for: The Wilderness Society, *Greenhouse Gas Emissions from Fossil Energy Extracted from Federal Lands and Waters*, Feb. 1, 2012.

<sup>26</sup> GAO, *Federal Oil & Gas Leases: Opportunities Exist to Capture Vented and Flared Natural Gas, Which Would Increase Royalty Payments and Reduce Greenhouse Gases*, GAO-11-34 at 12 (Table 1)(October 2010) (attached as Exhibit 46). This GHG equivalence assumes a CH<sub>4</sub> warming potential of 72 (20-year warming period) as per the Intergovernmental Panel on Climate Change’s Fourth Assessment Report and using EPA’s GHG equivalencies calculator.

### 3. Social cost of carbon.

Research conducted by the National Research Council has confirmed the fact that the negative impacts of energy generation from fossil fuels are not represented in the market price for such generation.<sup>27</sup> In other words, failing to internalize the externalities of energy generation from fossil fuels—such as the impacts to climate change and human health—has resulted in a market failure that requires government intervention. Executive Order 12866 directs federal agencies to assess and quantify such costs and benefits of regulatory action, including the effects on factors such as the economy, environment, and public health and safety, among others. *See* Exec. Order No. 12866, 58 Fed. Reg. 51,735 (Sept. 30, 1993).<sup>28</sup> The Ninth Circuit has ruled that agencies must include the climate benefits of a significant regulatory action in federal cost-benefit analyses to comply with EO 12866.

[T]he fact that climate change is largely a global phenomenon that includes actions that are outside of [the agency's] control ... does not release the agency from the duty of assessing the effects of its actions on global warming within the context of other actions that also affect global warming. *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1217 (9th Cir. 2008) (quotations and citations omitted); *see also Border Power Plant Working Grp. v. U.S. Dep't of Energy*, 260 F. Supp. 2d 997, 1028-29 (S.D. Cal. 2003) (finding agency failure to disclose project's indirect carbon dioxide emissions violates NEPA).

In response, an Interagency Working Group (“IWG”) was formed to develop a consistent and defensible estimate of the social cost of carbon—allowing agencies to “incorporate the social benefits of reducing carbon dioxide (CO<sub>2</sub>) emissions into cost-benefit analyses of regulatory actions that impact cumulative global emissions.”<sup>29</sup> In other words, SCC is a measure of the benefit of reducing greenhouse gas emissions now and thereby avoiding costs in the future.<sup>30</sup> The charts below depict, (A) dramatically increasing damages from global

---

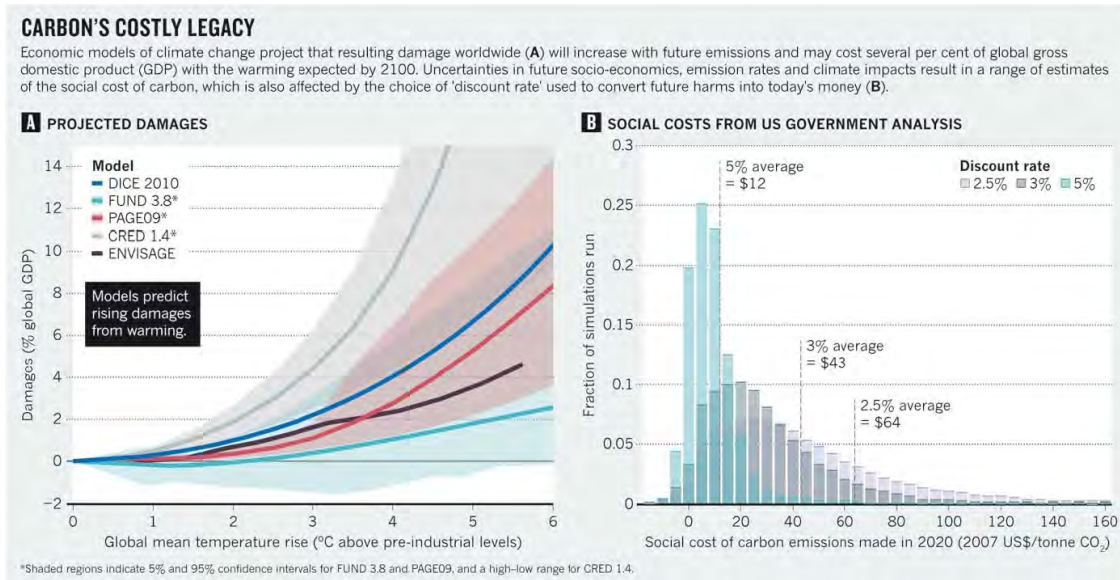
<sup>27</sup> *See, e.g.*, National Research Council, *Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use* (2010); Nicholas Muller, et. al., *Environmental Accounting for Pollution in the United States Economy*, AMERICAN ECONOMIC REVIEW (Aug. 2011); *see also*, Generation Investment Management, *Sustainable Capitalism*, (Jan. 2012) (advocating a paradigm shift to “a framework that seeks to maximize long-term economic value creation by reforming markets to address real needs while considering *all* costs and stakeholders.”).

<sup>28</sup> *See also* Executive Order 13563, 76 Fed. Reg. 3821 (Jan. 18, 2011) (reaffirming the framework of EO 12866 and directing federal agencies to conduct regulatory actions based on the best available science).

<sup>29</sup> *See* Interagency Working Group on the Social Cost of Carbon, United States Government, *Technical Support Document: Technical Update on the Social Cost of Carbon for Regulatory Impact Analysis – Under Executive Order 12866* (May 2013) at 2 (hereinafter 2013 TSD).

<sup>30</sup> *See* Ruth Greenspan and Dianne Callan, *More than Meets the Eye: The Social Cost of Carbon in U.S Climate Policy, in Plain English*, WORLD RESOURCES INSTITUTE (July 2011).

warming over time, as well as (B) the social cost of these carbon emissions based on 2013 TDS values.<sup>31</sup>



Leading economic models all point in the same direction: that climate change causes substantial economic harm, justifying immediate action to reduce emissions.<sup>32</sup> The interagency process to develop SCC estimates—originally described in the 2010 interagency technical support document (“TSD”), and updated in 2013—developed four values based on the average SCC from three integrated assessment models (DICE, PAGE, and FUND), at discount rates of 2.5, 3, and 5 percent,<sup>33</sup> as well as a fourth value demonstrating the cost of worst-case impacts.<sup>34</sup>

<sup>31</sup> See Richard Revesz, *et al.*, *Global warming: Improve economic models of climate change*, NATURE 508, 173-175 (April 10, 2014).

<sup>32</sup> See NATURE 508 at 174.

<sup>33</sup> The choice of which discount rate to apply—translating future costs into current dollars—is critical in calculating the social cost of carbon. The higher the discount rate, the less significant future costs become, which shifts a greater burden to future generations based on the notion that the world will be better able to make climate investments in the future. The underlying assumption of applying a higher discount rate is that the economy is continually growing. The IWG’s “central value” of three percent is consistent with this school of thought—that successive generations will be increasingly wealthy and more able to carry the financial burden of climate impacts. “The difficulty with this argument is that, as climate change science becomes increasingly concerning, it becomes a weaker bet that future generations will be better off. If they are not, lower or negative discount rates are justified.” WRI Report, at 9. “Three percent values an environmental cost or benefit occurring 25 years in the future at about half as much as the same benefit today.” *Id.*

<sup>34</sup> See 2013 TSD at 2.



These models are intended to quantify damages, including health impacts, economic dislocation, agricultural changes, and other effects that climate change can impose on humanity. While these values are inherently speculative, a recent GAO report has confirmed the soundness of the methodology in which the IWG's SCC estimates were developed, therefore further underscoring the importance of integrating SCC analysis into the agency's decisionmaking process.<sup>35</sup> In fact, certain types of damages remain either unaccounted for or poorly quantified in IWG's estimates, suggesting that the SCC values are conservative and should be viewed as a lower bound.<sup>36</sup>

The updated interagency SCC estimates for 2020 are \$12, \$43, \$65 and \$129 (in 2007\$).<sup>37</sup> The IWG does not instruct federal agency which discount rate to use, suggesting that the 3 percent discount rate (\$43 per ton of CO<sub>2</sub>) as the "central value," but further emphasizing "the importance and value of including all four SCC values[;]" i.e., that the agency should use the range of values in developing NEPA alternatives.<sup>38</sup>

The obligation to analyze the costs associated with GHG emissions through NEPA was directly affirmed by the court in *High Country Conservation Advocates v. U.S. Forest Service*, 52 F.Supp.3d 1174 (D.Colo. 2014) (a decision the agency decided not to appeal, thus implicitly recognizing the importance of incorporating a social cost of carbon analysis into NEPA decisionmaking). In his decision, Judge Jackson identified the IWG's SSC protocol as a tool to "quantify a project's contribution to costs associated with global climate change." *Id.* at 1190.<sup>39</sup> To fulfill this mandate, they agency must disclose the "ecological[,] ... economic, [and] social" impacts of the proposed action. 40 C.F.R. § 1508.8(b). Simple calculations applying

---

<sup>35</sup> GAO-14-663, *Social Cost of Carbon* (July 24, 2014).

<sup>36</sup> See Peter Howard, et al., *Omitted Damages: What's Missing From the Social Cost of Carbon*, ENVIRONMENTAL DEFENSE FUND, INSTITUTE FOR POLICY INTEGRITY, NATURAL RESOURCES DEFENSE COUNCIL (March 13, 2014) (providing, for example, that damages such as "increases in forced migration, social and political conflict, and violence; weather variability and extreme weather events; and declining growth rates" are either missing or poorly quantified in SCC models).

<sup>37</sup> See 2013 TSD at 3 (including a table of revised SCC estimates from 2010-2050). To put these figures in perspective, in 2009 the British government used a range of \$41-\$124 per ton of CO<sub>2</sub>, with a central value of \$85 (during the same period, the 2010 TSD used a central value of \$21). WRI Report at 4. The UK analysis used very different assumptions on damages, including a much lower discount rate of 1.4%. The central value supports regulation four times as stringent as the U.S. central value. *Id.*

<sup>38</sup> See 2013 TSD at 12.

<sup>39</sup> See also *id.* at 18 (noting the EPA recommendation to "explore other means to characterize the impact of GHG emissions, including an estimate of the 'social cost of carbon' associated with potential increases in GHG emissions.") (citing Sarah E. Light, *NEPA's Footprint: Information Disclosure as a Quasi-Carbon Tax on Agencies*, 87 Tul. L. Rev. 511, 546 (Feb. 2013)).

the SCC to GHG emissions from this project offer a straightforward comparative basis for analyzing impacts, and identifying very significant costs.<sup>40</sup>

Notably, according to the IPCC, the 20-year GWP for methane—which is the relevant timeframe for consideration if we are to stem the worst of climate change—is 87.<sup>41</sup> While BLM fails to quantify what percentage of stated GHG emissions from the project are from methane, EPA estimates provide that approximately 97% of emissions from oil production in the San Juan Basin are from methane.

Critically, however, the agency must not only quantify the estimated emissions from the projects *production*, but also the indirect impacts of combustion, as NEPA demands. *See* 40 C.F.R. § 1508.25(c). The final consumption of oil represents 80% of CO<sub>2</sub>e emissions.

As noted by Judge Jackson, the SCC protocol provides a tool to quantify the costs of these emissions. *See High Country Conservation Advocates*, 52 F.Supp.3d at 1190. By failing to consider the costs of GHG emissions from the Proposed Action, an agency’s analysis effectively assumes a price of carbon that is \$0. *See id.* at 21 (holding that although there is a “wide range of estimates about the social cost of GHG emissions[,] neither the BLM’s economist nor anyone else in the record appears to suggest the cost is as low as \$0 per unit. Yet by deciding not to quantify the costs as all, the agencies effectively zeroed out the cost in its quantitative analysis.”). The agency’s failure to consider the SCC is arbitrary and capricious, and ignores the explicit directive of EO 12866.

An agency must “consider every significant aspect of the environmental impact of a proposed action.” *Baltimore Gas & Elec. Co. v. Natural Resources Defense Council*, 462 U.S. 87, 107 (1983) (quotations and citation omitted). This includes the disclosure of direct, indirect, and cumulative impacts of its actions, including climate change impacts and emissions. 40 C.F.R. § 1508.25(c). The need to evaluate such impacts is bolstered by the fact that “[t]he harms associated with climate change are serious and well recognized,” and environmental changes caused by climate change “have already inflicted significant harms” to many resources around the globe. *Massachusetts v. EPA*, 549 U.S. 497, 521 (2007); *see also id.* at 525 (recognizing “the enormity of the potential consequences associated with manmade climate change.”). Among other things, the agency’s analysis must disclose “the relationship between local short-term uses of man’s environment and the maintenance and enhancement of long-term productivity[,]” including the “energy requirements and conservation potential of various alternatives and mitigation measures.” 42 U.S.C. § 4332(c); 40 C.F.R. § 1502.16(e). As explained by CEQ, this requires agencies to “analyze total energy costs, including possible hidden or indirect costs, and total energy benefits of proposed actions.” 43 Fed. Red. 55,978,

---

<sup>40</sup> It is important to note that, although the 2010 IWG SCC protocol did not address methane impacts, the 2013 IWG Technical Update explicitly addresses methane impacts. Thus, it is appropriate to calculate a SCC outcome that takes into account the full CO<sub>2</sub>e emissions associated with the proposed leasing.

<sup>41</sup> *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Working Group I Contribution to the IPCC Fifth Assessment Report Climate Change 2013: The Physical Science Basis*, at 8-58 (Table 8.7) (Sept. 2013).

55,984 (Nov. 29, 2978); *see also* Executive Order 13514, 74 Fed. Reg. 52,117 (Oct. 5, 2009) (requiring government agencies to disclose emissions information annually from direct and indirect activities). Failing to perform such analysis undermines the agency’s decisionmaking process and the assumptions made.

Moreover, accurate NEPA analyses must measure a planning area GHG emissions against a baseline of national and/or global GHG emissions to avoid marginalizing the Proposed Action’s contribution to our climate crisis while concluding agencies are powerless to avoid or mitigate such impacts. CEQ warns against such a comparison, providing:

Government action occurs incrementally, program-by-program and step-by-step, and climate impacts are not attributable to any single action, but are exacerbated by a series of smaller decisions, including decisions made by the government. Therefore, the statement that emissions from a government action or approval represent only a small fraction of global emissions is more a statement about the nature of the climate change challenge, and is not an appropriate basis for deciding whether to consider climate impacts under NEPA. Moreover, these comparisons are not an appropriate method for characterizing the potential impacts associated with ta proposed action and its alternatives and mitigation. CEQ Guidance at 9.

CEQ also provides that “[i]t is essential ... that Federal agencies not rely on boilerplate text to avoid meaningful analysis, including consideration of alternatives or mitigation.” *Id.* at 5-6 (citing 40 C.F.R. §§ 1500.2, 1502.2). Indeed, the EPA has also cautioned “against comparing GHG emissions associated with a single project to global GHG emission levels” because it erroneously leads to a conclusion that “on a global scale, emissions are not likely to change” as a result of the project.<sup>42</sup> Applying the SCC, as provided above, takes these abstract emissions and places them in concrete, economic terms. It also allows the agency to easily perform the cost-benefit analysis envisioned by EO 12866, as well as BLM’s own policy. Specifically, Instruction Memorandum No. 2013-131 (Sept. 18, 2013) is reflective of the BLM’s attempt to internalize the costs of such emissions:

All BLM managers and staff are directed to utilize estimates of nonmarket environmental values in NEPA analysis supporting planning and other decision-making where relevant and feasible, in accordance with the attached guidance. At least a qualitative description of the most relevant nonmarket values should be included for the affected environment and the impacts of alternatives in NEPA analyses....

Nonmarket environmental values reflect the benefits individuals attribute to experiences of the environment, uses of natural resources, or the existence of particular ecological conditions that do not involve market transactions and therefore lack prices. Examples include the perceived benefits from hiking in a wilderness or fishing for subsistence rather than commercial purposes. The economic methods described in this guidance provide monetary estimates of

---

<sup>42</sup> *See Light*, 87 Tul. L. Rev. 511, 546.

nonmarket values. Several non-economic, primarily qualitative methods can also be used to characterize the values attributed to places, landscapes, and other environmental features. Guidance on qualitative methods for assessing environmental values, including ethnography, interviews, and surveys, is in preparation.

Ideally, economic analysis for resource management should consider all relevant values, not merely those that are easy to quantify. Utilizing nonmarket values provides a more complete picture of the consequences of a proposed activity than market data alone would allow. The BLM's Land Use Planning Handbook, Appendix D encourages inclusion of information on nonmarket values, but does not provide detail.

The BLM, as well as BIA, simply cannot continue to ignore its obligation to consider the costs of GHG emissions in its decisionmaking. The SEIS cannot claim any supplementation to the existing environmental documents as SCC factors were not quantified in the FEIS Oil and Gas Development on the Southern Ute Indian Reservation (U.S. Department of the Interior [USDI] 2002), the PEA for 80-Acre Infill Oil and Gas Development on the Southern Ute Indian Reservation (USDI 2009) or the North Carracas Plan of Development EA (USDI 2013).

Nor can the agency tout the benefits of oil and gas development without similarly disclosing the costs. *See* 40 C.F.R. § 1502.23. This type of misleading and one-sided analysis is expressly forbidden. *See Hughes River Watershed Conservancy v. Glickman*, 81 F.3d 437, 446-47 (4th Cir. 1996) (“it is essential that the EIS not be based on misleading economic assumptions”); *Sierra Club v. Sigler*, 695 F.2d 957, 979 (5th Cir. 1983) (agency choosing to “trumpet” an action’s benefits has a duty to disclose its costs).

#### **4. Methane emissions and waste.**

The BLM, BIA and SUIT must take a hard look, and meaningful action, to address the serious issue of methane (“CH<sub>4</sub>”) emissions and waste in the oil and gas drilling and production processes. Such action must include an estimate of the projected methane emission rates from drilling and production activities authorized by the proposed action, as well as detailed analysis of measures employed to mitigate such emissions.

Methane emission rates can differ quite dramatically from one oil and gas field to the next, and, depending on the type of mitigation and emission controls employed, emissions can range anywhere from 1% to 12% of production.<sup>43</sup>

---

<sup>43</sup> *See, e.g.,* David T. Allen, et. al., *Measurements of methane emissions at natural gas production sites in the United States*, PNAS (Aug. 19, 2013) (finding emissions as low as 1.5% of production at select sites); Anna Karion, et. al., *Methane emissions estimate from airborne measurements over a western United States gas field*, GEOPHYSICAL RESEARCH LETTERS (Aug. 27, 2013) (finding emissions of 6 to 12 percent, on average, in the Uintah Basin). *See also*, Joe Romm, *Study of Best Fracked Wells Finds Low Methane Emissions But Skips Supper-Emitters*, CLIMATE PROGRESS (September 19, 2013), available at:

Assuming a lower-bound leak rate of 1% – which is approximately one-third lower than the EPA estimate of methane emissions in the Inventory of U.S. GHG Emissions and Sinks: 1990-2011<sup>44</sup> – methane emissions from gas production by the proposed action could represent a meaningful contribution of emissions over the life of the developed field.<sup>45</sup> Assuming an upper-bound leak rate of 12%, the high end of the rate found in a 2012 study using air sampling over the Uinta Basin,<sup>46</sup> methane emissions from gas could be truly significant indeed. Although there is substantial variability between the 1% and 12% emission leak rates – and, even without specific data from the proposed action, we can assume leakage somewhere between these two extremes – even at the low end emissions would not be trivial.

Even setting aside the issue of climate change, every ton of methane emitted to the atmosphere from oil and gas development is a ton of natural gas *lost*. Every ton of methane lost to the atmosphere is therefore a ton of natural gas that cannot be used by consumers. Methane lost from federal leases may also not yield royalties otherwise shared between federal, state, and local governments. This lost gas reflects serious inefficiencies in how BLM oil and gas leases are developed. Energy lost from oil and gas production – whether avoidable or unavoidable – reduces the ability of a lease to supply energy, increasing the pressure to drill other lands to supply energy to satisfy demand. 40 C.F.R. §§ 1502.16(e)-(f). In so doing, inefficiencies create indirect and cumulative environmental impacts by increasing the pressure to satisfy demand with new drilling. 40 C.F.R. §§ 1508.7, 1508.8(b).

## 5. Mineral Leasing Act's duty to prevent waste.

Citizen Groups have been urging BLM and BIA to adopt common sense and economical measures to address the issue of fugitive methane waste. The agencies have expansive authority – and, indeed, the responsibility and opportunity – to prevent the waste of oil and gas resources, in particular methane, which is the primary constituent of natural gas. The Mineral Leasing Act of 1920 (“MLA”) provides that “[a]ll leases of lands containing oil or gas ... shall be subject to the condition that the lessee will, in conducting his explorations and mining operations, use all

---

<http://thinkprogress.org/climate/2013/09/19/2646881/study-fracked-wells-methane-emissions-super-emitters/>. See also GAO-11-34 (2010) at 25 (using a conversion factor of .4045 MMTCO<sub>2</sub>e/Bcf for vented gas).

<sup>44</sup> See U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011* (April 2013).

<sup>45</sup> See U.S. Environmental Protection Agency, *Greenhouse Gas Equivalencies Calculator*, available at: <http://www.epa.gov/cleanenergy/energy-resources/calculator.html>.

<sup>46</sup> See Brian Maffly, *Uinta Basin gas leakage far worse than most believe*, THE SALT LAKE TRIBUNE (Aug 05, 2013), available at: <http://www.sltrib.com/sltrib/news/56692751-78/basin-carbon-emissions-gas.html.csp> (“Between 6 percent and 12 percent of the Uinta Basin’s natural gas production could be escaping into the atmosphere.”).

reasonable precautions to prevent waste of oil or gas developed in the land....” 30 U.S.C. § 225; *see also* 30 U.S.C. § 187 (“Each lease shall contain...a provision...for the prevention of undue waste....” As the MLA’s legislative history teaches, “conservation through control was the dominant theme of the debates.” *Boesche v. Udall*, 373 U.S. 472, 481 (1963) (citing H.R.Rep. No. 398, 66th Cong., 1st Sess. 12-13; H.R.Rep. No. 1138, 65th Cong., 3d Sess. 19 (“The legislation provided for herein...will [help] prevent waste and other lax methods....”))).

BLM’s implementing regulations, reflecting these provisions, currently provide that “[t]he objective” of its MLA regulations in 43 C.F.R. Subpart 3160 “is to promote the orderly and efficient exploration, development and production of oil and gas. 43 C.F.R. § 3160.0-4. In part, “orderly and efficient” operations are ensured through unitization or communitization agreements. 43 C.F.R. §§ 3161.2, 3162.2-4(b) (BLM authority to require lessees unitization or communitization agreements); 43 C.F.R. Subpart 3180 (general rules pertaining to drilling unit agreements). Such unit agreements, because they may limit BLM authority in subsequent stages, are therefore important tools for preventing waste. *See William P. Maycock et al.*, 177 IBLA 1, 20-21 (Dec. Int. 2008) (“BLM is not required to analyze an alternative that is [n]ot feasible because it is inconsistent with the basic presumption of the Unit Agreement and BLM cannot legally compel the operator to adopt that alternative under the terms of the Unit Agreement”).

Critically, subpart 3160 specifically requires BLM officials to ensure “that all [oil and gas] operations be conducted in a manner which protects other natural resources and the environmental quality, protects life and property and results in the maximum ultimate recovery of oil and gas with minimum waste and with minimum adverse effect on the ultimate recovery of other mineral resources.” 43 C.F.R. § 3161.2 (emphasis added). The lease owner and or operator is, similarly, charged with “conducting all operations in a manner which ensures the proper handling, measurement, disposition, and site security of leasehold production; which protects other natural resources and environmental quality; which protects life and property; and which results in maximum ultimate economic recovery of oil and gas with minimum waste and with minimum adverse effect on ultimate recovery of other mineral resources.” 43 C.F.R. § 3162.1(a) (emph. added). Waste is defined as “(1) A reduction in the quantity or quality of oil and gas ultimately producible from a reservoir under prudent and proper operations; or (2) avoidable surface loss of oil or gas.” 43 C.F.R. § 3160.0-5. Avoidable losses of oil or gas are currently defined as including venting or flaring without authorization, operator negligence, failure of the operator to take “all reasonable measures to prevent and/or control the loss,” and an operator’s failure to comply with lease terms and regulations, order, notices, and the like. *Id.*

In many respects, we think that BLM’s current rules can be tightened. Regardless, it is clear that BLM’s expansive authority, responsibility, and opportunity to prevent waste must permeate the agency’s full planning and decisionmaking processes for oil and gas. The BLM and BIA must ensure that any development authorized by the proposed action take advantage of not only proven, often economical technologies and practices to prevent methane waste, but, further, the agency’s tools to ensure the orderly and efficient exploration, development, and production of oil and gas through controls placed on the very scale, pace, and nature of development. Moreover, it is clear that BLM’s authority, responsibility, and opportunity extends to both existing and future oil and gas development. BLM, ultimately, manages the federal – i.e., publicly owned – onshore oil and gas resource in trust for the American people and has stated

responsibility in this SEIS scoping for subsurface operation administration while BIA has stated authority over “lease activity.”

On November 19, 2013, a coalition of over 90 environmental, health, and sporting organizations submitted an open letter to Secretary Jewell of the U.S. Department of Interior and Administrator McCarthy of the U.S. Environmental Protection Agency calling for action to substantially reduce emissions of methane from the oil and gas industry on public and private lands, as well as from offshore oil operations. The coalition called on Secretary Jewell to reduce emissions from oil and gas operations on public lands by updating decades-old BLM rules on waste of mineral resources. Further, we asked Administrator McCarthy to directly regulate methane emissions from the oil and gas industry using existing Clean Air Act authority and to develop nationwide curbs on GHG emissions.

Notably, BLM is currently undertaking federal rulemaking pertaining to Onshore Oil and Gas Order No. 9, Waste Prevention and Use of Produced Oil and Gas for Beneficial Purposes. *See* 43 C.F.R. § 3164.1 (authorizing the Director to issue Onshore Oil and Gas Orders to implement or supplement regulations).

In a statement regarding Order No. 9, the agency provided:

This new order would establish standards to limit the waste of vented and flared gas and to define the appropriate use of oil and gas for beneficial use. This order would, among other things, delineate which activities qualify for beneficial use, minimize the amount of venting and flaring that takes place on oil and gas production facilities on Federal and Indian lands, and establish standards for determining avoidable versus unavoidable losses. (Office of Information and Regulatory Affairs, Unified Agenda and Regulatory Plan, RIN: 1004-AE14.)

The BLM must consider federal rulemaking on Order No. 9, and the implications that this rule would have on place-based action, such as the SEIS, in its planning level decisionmaking.

## **6. President Obama’s Climate Action Plan and Secretarial Order 3289.**

President Obama’s June, 2015 Climate Action Plan explains that “[c]urbing emissions of methane is critical to our overall effort to address global climate change.” *See* Climate Action Plan at 10. The President’s call for action ties in nicely with BLM’s authority and responsibilities, beyond the MLA, to reduce methane emissions.

The starting point is the Federal Land Policy and Management Act of 1976 (“FLPMA”). Pursuant to FLPMA, the agencies must manage the public lands:

in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that, where appropriate, will preserve and protect certain public lands in their

natural condition, that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use.(43 U.S.C. § 1701(a)(8) (emphasis added).

The BLM, as a multiple use agency, must also manage the public lands and the oil and natural gas resource to “best meet the present and future needs of the American people” and to ensure that management “takes into account the long-term needs of future generations for...non-renewable resources, including...minerals.” 43 C.F.R. § 1702(c). Put differently, the driving force behind agency-authorized oil and gas development is the long-term, and broad, public interest – not the often short-term, and narrow, interest of oil and gas companies. The agencies duty to prevent waste must account for this driving force.

Here, BLM must ensure that these objectives and duties are adhered to through the completion its NEPA analysis, which must, *inter alia*, “use and observe the principles of multiple use and sustained yield” and “weigh long-term benefits to the public against short-term benefits.” *See* 43 U.S.C. § 1712(c)(1), (7). Thus, the TRFO has a substantive duty to consider the enduring legacy of oil and gas development in land management decisionmaking, which is to be balanced against other critical multiple use resource values.

Additionally, the BLM, as an agency within the U.S. Department of the Interior, is subject to Secretarial Order 3289 (Dept. Int. Sept. 14, 2009). Secretarial Order 3289, in section 3(a), provides that BLM “must consider and analyze climate change impacts when undertaking long-range planning exercises, setting priorities for scientific research and investigations, developing multi-year management plans, and making major decisions regarding potential use of resources under the Department’s purview.” Section 3(a) of Secretarial Order 3289 also reinstated Secretarial Order 3226 (January 19, 2001). Secretarial Order 3226 commits the Department of the Interior to address climate change through its planning and decisionmaking processes. As the Order explains, “climate change is impacting natural resources that the Department of the Interior (Department) has the responsibility to manage and protect.” Sec. Or. 3226, § 1. The Order therefore “ensures that climate change impacts are taken into account in connection with Department planning and decision making.” *Id.* The Order obligates BLM to “consider and analyze potential climate change impacts” in four situations: (1) “when undertaking long-range planning exercises”; (2) “when setting priorities for scientific research and investigations”; (3) “when developing multi-year management plans, and/or” (4) “when making major decisions regarding the potential utilization of resources under the Department’s purview.” *Id.* § 3. The Order specifically provides that “Departmental activities covered by this Order” include “management plans and activities developed for public lands” and “planning and management activities associated with oil, gas and mineral development on public lands.” *Id.* (emphasis added). BLM’s oil and gas decisions are thus contemplated by and subject to section 3 of the Order.

These authorities and responsibilities can be properly exercised through effective use of NEPA. To comply with NEPA, the BLM, BIA and SUIT must take a hard look at direct, indirect, and cumulative impacts, as discussed above. 40 §§ C.F.R. 1502.16(a), (b); 1508.25(c). In evaluating impacts, the agency must discuss “[e]nergy requirements and conservation



potential of various alternatives and mitigation measures,” “[n]atural or depletable resource requirements and conservation potential of various alternatives and mitigation measures,” and “[m]eans to mitigate adverse environmental impacts (if not fully covered under 1502.14(f)).” 40 C.F.R. §§ 1502.16(e), (f), (h).

We emphasize, here, the “heart” of the NEPA process: BLM, BIA and SUI’s duty to consider “alternatives to the proposed action” and to “study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources.” 42 U.S.C. §§ 4332(2)(C)(iii), 4332(2)(E); 40 C.F.R. § 1502.14(a). Alternatives are critical because, “[c]learly, it is pointless to ‘consider’ environmental costs without also seriously considering action to avoid them.” *Calvert Cliffs’ Coordinating Comm., Inc. v. U.S. Atomic Energy Commn.*, 449 F.2d 1109, 1128 (D.C. Cir. 1971). Operating in concert with NEPA’s mandate to address environmental impacts, BLM’s fidelity to alternatives analysis helps “sharply defin[e] the issues and provid[e] a clear basis for choice among options by the decision maker and the public.” 40 C.F.R. § 1502.14. An agency must, accordingly, “[r]igorously explore and objectively evaluate all reasonable alternatives” and specifically “[i]nclude the alternative of no action.” 40 C.F.R. §§ 1502.14(a), (d). Even where impacts are “insignificant,” BLM must still consider alternatives. *Bob Marshall Alliance v. Hodel*, 852 F.2d 1223, 1229 (9<sup>th</sup> Cir. 1988) (agency’s duty to consider alternatives “is both independent of, and broader than,” its duty to complete an environmental analysis); *Greater Yellowstone Coalition v. Flowers*, 359 F.3d 1257, 1277 (10<sup>th</sup> Cir. 2004) (duty to consider alternatives “is ‘operative even if the agency finds no significant environmental impact’”). Due to the fact that horizontal drilling to shale formation is new technology, it is critical that the SEIS or EIS develop alternatives that include the highest level of pre-planning for the 1,534 wells and ancillary facilities. This is important is cumulatively assessing impacts and not waiting for the well by well assessment (APD or sundry level) where impacts are potentially segmented, in violation of NEPA.

## **7. Methane mitigation measures should be adopted and analyzed.**

There are several widely recognized best management practices (“BMPs”) for mitigating methane emissions that must be considered by BLM, BIA and SUI in their analysis of the proposed action. We believe that most, if not all of these measures should be considered and adopted, both because they can reduce methane emissions from significant emissions sources and because they have also been shown to have very quick paybacks from the sale of captured methane, even at today’s low gas prices. The most important of these measures include:

- Centralized Liquid Gathering Systems and Liquid Transport Pipelines
- Reduced Emission Completions/Recompletions (green completions)
- Low-Bleed/No-Bleed Pneumatic Devices on all New Wells
- Dehydrator Emissions Controls

- Replace High-bleed Pneumatics with Low-Bleed/No-Bleed or Air-Driven Pneumatic Devices on all Existing Wells; and
- Electric Compression
- Liquids Unloading (using plunger lifts or other deliquification technologies)
- Improved Compressor Wet Seal Maintenance/Replacement with Dry Seals
- Vapor Recovery Units on Storage Vessels
- Pipeline Best Management Practices; and
- Leak Detection and Repair

These and other mitigation measures are included among Best Management Practices that have been identified by BLM, EPA, the State of Colorado, and other organizations, as detailed below.<sup>47</sup>

BLM, BIA and SUIT must avoid operations that contribute to waste and loss of royalties/revenues and that also adversely impact air quality and public health.

Another area of concern to Citizen Groups is the effectiveness of the mitigation measures adopted to ensure that the methane captured is able to make it to market for sale and the realization of rapid payback. Such considerations must be included in the NEPA analysis. This includes, *inter alia*, how the agency will require operators on private and public lands to coordinate development to ensure that centralized liquids gathering and treatment investments are made prior to the appraisal and field development phase when production increases dramatically. The agencies should identify and describe the mechanisms they plan to employ to achieve this desirable outcome.

The second issue is how gas (as opposed to liquids) captured by implementation of the mitigation measures will enter sales gas lines and make it to market, as opposed to simply being flared and wasted. Citizen Groups believe that the agencies should spell-out whether all of the gas captured by the mitigation measures adopted is expected to have similar access to a sales line, or whether some or all of it will be sent to flares and wasted. If the latter, Citizen Groups believe that additional mitigation measures should be instituted, comparable to the measure adopted for liquids, requiring planning and timely development of gas gathering and treatment infrastructure to ensure that GHG emissions are reduced, that revenues from gas sales are maximized for the realization of paybacks for operators, royalty payments for the federal and state governments, and that waste of waste of this important resource is minimized.

---

<sup>47</sup> See also BLM, Best Management Practices for Fluid Minerals, available at: [http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS\\_\\_REALTY\\_\\_AND\\_RESOURCE\\_\\_PROTECTION\\_/bmps.Par.60203.File.dat/WO1\\_Air%20Resource\\_BMP\\_Slideshow%2005-09-2011.pdf](http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS__REALTY__AND_RESOURCE__PROTECTION_/bmps.Par.60203.File.dat/WO1_Air%20Resource_BMP_Slideshow%2005-09-2011.pdf).

Notably, the TRFO has already taken pioneering steps to address methane emissions and waste through mandatory mitigation measures at the RMP stage. Specifically, in a joint Land and Resource Management Plan (“LRMP”), BLM: 1610 (CO-933), adopted by BLM TRFO and the San Juan National Forest (“SJNF”), the agencies broke new and essential ground in both acknowledging that significant GHG pollution would result from oil and gas development on TRFO lands, and then establishing required methane mitigation standards at the planning stage that will bind future leases and permits to drill to comply with these measures. As provided in the Final EIS for the LRMP:

NEPA analysis is typically conducted for oil and gas leasing and when permits are issued. **This FEIS is the first NEPA analysis where lands that could be made available for lease are identified and stipulated.** In a subsequent analysis stage, when there is a site-specific proposal for development, additional air quality impact analysis would occur. This typically occurs when an application for a permit to drill is submitted. Based on the analysis results, additional mitigation or other equally effective options could be considered to reduce air pollution. Final EIS at 372 (emphasis added).

The TRFO set a new standard by recognizing that the climate change impacts from oil and gas industry activities are cumulative and that methane losses from business-as-usual industry practices at the field office level contribute significantly to climate change and must be mitigated. In the Final EIS, the TRFO also recognized that methane emissions represent waste of a key natural resource that belongs to all U.S. citizens, and the failure to control such waste robs the U.S. and state treasuries of royalty revenues. Accordingly, the TRFO adopted six important methane mitigation measures, which include:

- Centralized Liquid Gathering Systems and Liquid Transport Pipelines
- Reduced Emission Completions/Recompletions (green completions)
- Low-Bleed/No-Bleed Pneumatic Devices on all New Wells
- Dehydrator Emissions Controls
- Replace High-bleed Pneumatics with Low-Bleed/No-Bleed or Air-Driven Pneumatic Devices on all Existing Wells; and
- Electric Compression

*Id.* at 376.

It is essential to consider the pioneering action taken by the TRFO. *See* 40 C.F.R. § 1502.9(c)(1)(ii). It is also important to recognize that part of the proposed project area in the scoping for the EIS is San Juan National Forest Land. Historically, the dismissive approach the agency has taken on climate change, and failure to adequately address methane emissions altogether, is plainly incompatible with the climate impacts of oil and gas development. It is

incumbent upon the TRFO as the primary preparer of this EIS to confront the issues of climate change and methane emissions head-on, which must be accomplished through decisionmaking that is reflective of challenges we face.

Moreover, and in addition to both national rulemaking and precedent-setting action at the local field office level, BLM's Colorado State Office has recently adopted its Comprehensive Air Resources Protection Protocol ("CARPP"), which, as provided by the agency:

[D]escribes the process and strategies the BLM will use when authorizing activities that have the potential to adversely impact air quality within the state of Colorado. This protocol also outlines specific measures that may be taken to address BLM-approved activities with the potential to cause significant adverse impacts to air resources ... within any planning area [ ]. Further, the purposes of this protocol are to address air quality issues identified by the [BLM], or public scoping, in its analysis of potential impacts on air resources for BLM Colorado [RMPs] and [EIS']; and clarify the mechanisms and procedures that BLM will use to achieve the air resources goals, objectives, and management actions set forth in BLM Colorado RMPs.

The BLM Colorado CARPP is binding on the TRFO and provides an important state-of-the-art resource to guide the agency's analysis of GHG mitigation measures applicable to the SEIS. In particular, Table V-I identifies Best Management Practices and Air Emission Reduction Strategies for Oil and Gas Development.

## **8. The capture of methane is critical due to its global warming potential.**

Ensuring compliance with the agency's methane waste obligations through proper analysis and documentation in the NEPA process is important: technologies and practices change, and the BLM's duty to prevent degradation and waste cannot be excused just because the agency apparently lags behind the technological curve. The GAO's 2010 report noted that BLM's existing waste prevention guidance – Notice to Lessees and Operators ("NTL") 4a – was developed in 1980, well before many methane reduction technologies and practices were developed and understood. GAO also found that NTL 4a does not "enumerate the sources that should be reported or specify how they should be estimated."<sup>48</sup> Problematically, GAO noted "that [BLM] thought the industry would use venting and flaring technologies if they made economic sense," a perspective which assumes – wrongly – that markets work perfectly in the absence of necessary regulatory signals and is belied by the lack of information about the magnitude of methane waste and the documented, if still poorly understood, barriers to the deployment of GHG reduction technologies and practices. *Id.* at 20-33. Compounding the problem, GAO also "found a lack of consistency across BLM field offices regarding their understanding of which intermittent volumes of lost gas should be reported to [the Oil and Gas Operations Report]." *Id.* at 11. BLM, to its credit, conceded: "existing guidance was outdated

---

<sup>48</sup> See GAO-11-34 (2010) at 11, 27.

given current technologies and said that they were planning to update it by the second quarter of 2012.” *Id.* at 27.

Indeed, a Report released by NRDC identified that “[c]apturing currently wasted methane for sale could reduce pollution, enhance air quality, improve human health, conserve energy resources, and bring in more than \$2 billion of additional revenue each year.”<sup>49</sup> Moreover, the Report further identified ten technically proven, commercially available, and profitable methane emission control technologies that together can capture more than 80 percent of the methane currently going to waste. *Id.* Such technologies must also be considered in BLM’s alternatives analysis.

Preventing GHG pollution and waste is particularly important in the natural gas context, where there is an absence of meaningful lifecycle analysis of the GHG pollution emitted by the production, processing, transmission, distribution, and combustion of natural gas. Although natural gas is often touted as a ‘cleaner’ alternative to dirty coal, recent evidence indicates that this may not, in fact be the case – and, at the least, indicates that we must first take immediate, common sense action to reduce GHG pollution from natural gas before it can be safely relied on as an effective tool to transition to a clean energy economy (a noted priority of this Administration).<sup>50</sup> A recent report by Climate Central addresses the leak rates estimated by various sources and the impacts of this new information on assertions that natural gas is a cleaner fuel than coal, ultimately concluding that given the losses from oil and gas sources it would be decades before switching electricity generation from coal to natural gas could bring about significant reductions in emissions.<sup>51</sup>

Oil and natural gas systems are the biggest contributor to methane emissions in the United States, accounting for over one quarter of all methane emissions.<sup>52</sup> In light of serious controversy and uncertainties regarding GHG pollution from oil and gas development, the agencies quantitative assessment should account for methane’s long-term (100-year) global warming impact and, also, methane’s short-term (20-year) warming impact using the latest peer-reviewed science to ensure that potentially significant impacts are not underestimated or ignored. *See* 40 C.F.R. § 1508.27(a) (requiring consideration of “[b]oth short- and long-term effects”).

---

<sup>49</sup> Susan Harvey, et al., *Leaking Profits: The U.S. Oil and Gas Industry Can Reduce Pollution, Conserve Resources, and Make Money by Preventing Methane Waste* (March 2012).

<sup>50</sup> Robert W. Howarth, *Assessment of the Greenhouse Gas Footprint of Natural Gas from Shale Formations Obtained by High-Volume, Slick-Water Hydraulic Fracturing* (Rev’d. Jan. 26, 2011). *See also* Robert W. Howarth et al., *Venting and Leaking of Methane from Shale Gas Development: Response to Cathles et al.* (2012); Eric D. Larson, PhD, Climate Central, *Natural Gas and Climate Change* (May 2013).

<sup>51</sup> *See* Larson.

<sup>52</sup> *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011.*

EPA's GHG Inventory – which BLM has historically relied upon in its analysis – assumes that methane is 21 times as potent as carbon dioxide (“CO<sub>2</sub>”) over a 100-year time horizon,<sup>53</sup> a global warming potential (“GWP”) based on the Intergovernmental Panel on Climate Change's (“IPCC”) Second Assessment Report from 1996.<sup>54</sup> However, the IPCC recently updated their 100-year GWP for methane, substantially increasing the heat-trapping effect to 36.<sup>55</sup> A Supplementary Information Report (“SIR”), prepared for BLM's oil and gas leasing program in Montana and the Dakotas, further explains that GWP “provides a method to quantify the cumulative effect of multiple GHGs released into the atmosphere by calculating carbon dioxide equivalent (CO<sub>2</sub>e) for the GHGs.” SIR at 1-2.<sup>56</sup> However, substantial questions arise when you calibrate methane's GWP over the 20-year planning and environmental review horizon used in the SIR and, typically, by BLM. *See* SIR at 4-1 thru 4-45 (discussing BLM-derived reasonably foreseeable development potential in each planning area). Over this 20-year time period, the IPCC's new research has calculated that methane's GWP is 87<sup>57</sup> – yet another substantial increase from its earlier estimate of 72, which was still over three times as potent as otherwise assumed by the SIR.<sup>58</sup>

However, recent peer-reviewed science demonstrates that gas-aerosol interactions amplify methane's impact such that methane is actually 105 times as potent over a twenty year time period.<sup>59</sup> This information suggests that the near-term impacts of methane emissions have been significantly underestimated. *See* 40 C.F.R. § 1508.27(a) (requiring consideration of short and long term effects). Further, by extension, BLM has also significantly underestimated the near-term benefits of keeping methane emissions out of the atmosphere. 40 C.F.R. §§

---

<sup>53</sup> *See* 78 Fed.Reg. 19802, April 2, 2013 (EPA proposal to increase methane's GWP to 25 times CO<sub>2</sub>).

<sup>54</sup> INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Second Assessment Report* (1996) (attached as Exhibit 52); *see also* U.S. Environmental Protection Agency, *Methane*, available at: <http://www.epa.gov/outreach/scientific.html>.

<sup>55</sup> *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Working Group I Contribution to the IPCC Fifth Assessment Report Climate Change 2013: The Physical Science Basis*, at 8-58 (Table 8.7) (Sept. 2013).

<sup>56</sup> BLM, *Climate Change, Supplementary Information Report, Montana, North Dakota and South Dakota* (2010) available at: [www.blm.gov/mt/st/en/prog/energy/oil\\_and\\_gas/leasing/leasingEAs.html](http://www.blm.gov/mt/st/en/prog/energy/oil_and_gas/leasing/leasingEAs.html).

<sup>57</sup> *See* IPCC *Physical Science Report*.

<sup>58</sup> *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Fourth Assessment Report, Working Group 1, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Ch. 2, p. 212, Table 2.14, available at: [www.ipcc.ch/publications\\_and\\_data/ar4/wg1/en/ch2s2-10-2.html](http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html).

<sup>59</sup> Drew Shindell et al., *Improved Attribution of Climate Forcing to Emissions*, *SCIENCE* 2009 326 (5953), p. 716, available at: [www.sciencemag.org/cgi/content/abstract/326/5953/716](http://www.sciencemag.org/cgi/content/abstract/326/5953/716).

1502.16(e), (f); *id.* at 1508.27. These estimates are important given the noted importance of near term action to ameliorate climate change – near term action that scientists say should focus, *inter alia*, on preventing the emission of short-lived but potent GHGs like methane while, at the same time, stemming the ongoing increase in the concentration of carbon dioxide.<sup>60</sup> These uncertainties necessitate analysis. 40 C.F.R. §§ 1508.27(a), (b)(4)-(5).

Additional, serious, yet unaddressed uncertainties pertain to the magnitude of methane pollution from oil and gas emissions sources. As provided in the most recent EPA Inventory of Emissions and Sinks: 1990-2011, “[f]urther research is needed in some cases to improve the accuracy of emission factors used to calculate emissions from a variety of sources;” specifically citing the lack of accuracy in emission factors applied to methane sources.<sup>61</sup> A lack of data reliability has resulted in notable variation in methane emissions reporting from year to year. For example, in a Technical Support Document (“TSD”) prepared for EPA’s mandatory GHG reporting rule for the oil and gas sector for 2012, EPA determined that several emissions sources were projected to be “significantly underestimated.”<sup>62</sup> EPA thus provided revised emissions factors for four of the most significant underestimated sources that ranged from ten times higher (for well venting from liquids unloading) to as many as 3,500 and 8,800 times higher (for gas well venting from completions and well workovers of unconventional wells).<sup>63</sup> When EPA accounted for just these four revisions, it more than doubled the estimated GHG emissions from oil and gas production, from 90.2 million metric tons of CO<sub>2</sub> equivalent (“MMTCO<sub>2</sub>e”) to 198.0 MMTCO<sub>2</sub>e.<sup>64</sup> However, these emission estimates are based on an outdated GWP of 21. Using the IPCC’s new 100-year GWP for methane of 34, that is 320.5 MMTCO<sub>2</sub>e, and, considering a 20-year GWP of 84, that is 792.0 MMTCO<sub>2</sub>e – or, respectively, the equivalent emissions from 90.7 or 224 coal fired power plants that is wasted annually. These upward revisions were based primarily on EPA’s choice of data set, here, having replaced Energy Information Administration (“EIA”) data with emissions data from an EPA and Gas Research Institute (“GRI”) study. In the current year, EPA relied on yet another set of data; this time from an oil and gas industry survey of well data conducted by the American Petroleum Institute (“API”) and the American Natural Gas Alliance (“ANGA”).<sup>65</sup> The API/ANGA survey was conducted in response to EPA’s upward

---

<sup>60</sup> See, e.g., *Limiting Global Warming: Variety of Efforts Needed Ranging from 'Herculean' to the Readily Actionable, Scientists Say*, SCIENCE DAILY (May 4, 2010), available at: <http://www.sciencedaily.com/releases/2010/05/100503161328.htm>; see also, Ramanathan, et. al.

<sup>61</sup> *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011*, at 1-19.

<sup>62</sup> U.S. Environmental Protection Agency, *Greenhouse Gas Emissions Reporting From The Petroleum And Natural Gas Industry Background Technical Support Document*, at 8, available at: <http://www.epa.gov/climatechange/emissions/subpart/w.html>.

<sup>63</sup> *Id.* at 9, Table 1; see also *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011*.

<sup>64</sup> See EPA, *GHG Emissions Reporting* at 10, Table 2.

<sup>65</sup> *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011*, at 3-63.

adjustments in the previous GHG inventory, noting that “[i]ndustry was alarmed by the upward adjustment,” and focused specifically on emissions from liquids unloading and unconventional gas well completions and workovers.<sup>66</sup> Overall, the survey found that revising emissions from these two sources alone would reduce EPA oil and gas methane emissions estimates, which resulted in reported oil and gas production emissions at 100 MMTCO<sub>2</sub>e pursuant to the EPA’s GHG Reporting Program.<sup>67</sup>

To provide a specific example of these differing data sets, EPA previously used an emissions factor of 3 thousand standard cubic feet (“Mcf”) of gas emitted to the atmosphere per well completion in calculating its GHG inventory. EPA determined that this figure was significantly underestimated and that a far more accurate emissions factor was 9,175 Mcf per well.<sup>68</sup> The API/ANGA study suggested that this emission factor is 9,000 Mcf.<sup>69</sup> However, these emissions factors are simply broad, generalized estimates for well emissions across the nation, and can vary significantly from one geologic formation to the next. For example, emissions reported in the Piceance Basin are as high as 22,000 Mcf of gas per well.<sup>70</sup>

Despite this variability in methane pollution data, what remains clear is that inefficiencies and leakage in oil and gas production results in a huge amount of avoidable waste and emissions, and, conversely, a great opportunity for the BLM to reduce GHG emissions on our public lands. Many of these uncertainties and underestimates, as EPA has explained, are a result of the fact that emissions factors were “developed prior to the boom in unconventional well drilling (1992) and in the absence of any field data and does not capture the diversity of well completion and workover operations or the variance in emissions that can be expected from different hydrocarbon reservoirs in the country.” *Mandatory GHG Reporting Rule*, 75 Fed. Reg. 18608, 18621 (April 12, 2010). These underestimates are also caused by the dispersed nature of oil and gas equipment – rather than a single, easily grasped source, such as a coal-fired power plant, oil and gas production consists of large numbers of wells, tanks, compressor stations, pipelines, and other equipment that, individually, may appear insignificant but, cumulatively, may very well be quite significant. While dispersed, oil and gas development is nonetheless a massive, landscape-scale industrial operation – one that just happens to not have a single roof. BLM, as the agency charged with oversight of onshore oil and gas development, therefore has an opportunity to

---

<sup>66</sup> API/ANGA, *Characterizing Pivotal Sources of Methane Emissions from Natural Gas Production: Summary and Analysis of API and ANGA Survey Responses*, Sept. 2012, at 1.

<sup>67</sup> See EPA, *Petroleum and Natural Gas Systems: 2011 Data Summary (for 2013 GHG Reporting)*, at 3.

<sup>68</sup> See EPA, *GHG Emissions Reporting*, attached above as Exhibit 57 at Appendix B at 84-87.

<sup>69</sup> *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011*, at 3-69.

<sup>70</sup> See, e.g., EPA, *Natural Gas STAR Program, Recommended Technologies and Practices for Wells*, available at: [www.epa.gov/gasstar/tools/recommended.html](http://www.epa.gov/gasstar/tools/recommended.html); see also EPA, *Natural Gas STAR Program, Reduced Emissions Completions*, Oct. 26, 2005, at 14.



improve our knowledge base regarding GHG emissions from oil and gas production, providing some measure of clarity to this important issue by taking the requisite “hard look” NEPA analysis as part of its decisionmaking for the proposed action.<sup>71</sup>

Convincing evidence also exists to support the consideration of alternatives that would attach meaningful stipulations to areas open to oil and gas development. As a prime contributor to short-term climate change over the next few decades, methane is a prime target for near-term GHG reductions. In fact, there are many proven technologies and practices already available to reduce significantly the methane emissions from oil and gas operations, further detailed below. These technologies also offer opportunities for significant cost-savings from recovered methane gas. Moreover, new research indicates that tropospheric ozone and black carbon (“BC”) contribute to both degraded air quality and global warming, and that emission control measures can reduce these pollutants using current technology and experience.<sup>72</sup> Employment of these strategies will annually avoid a substantial number of premature deaths from outdoor air pollution, as well as increase annual crop yields by millions of metric tons due to ozone reductions. Indeed, reducing methane emissions is important not only to better protect the climate, but also to prevent waste of the oil and gas resource itself and the potential loss of economic value, including royalties. BLM should evaluate these technologies, analyzing the benefits of technological implementation versus current agency requirements.

These benefits – as well as the proven, cost-effective technologies and practices that achieve these benefits – are documented by EPA’s “Natural Gas STAR” program, which encourages oil and natural gas companies to cut methane waste to reduce climate pollution and recover value and consolidates the lessons learned from industry for the benefit of other companies and entities with oil and gas responsibilities such as BLM.<sup>73</sup> EPA has identified well over 100 proven technologies and practices to reduce methane waste from wells, tanks, pipelines, valves, pneumatics, and other equipment and thereby make operations more efficient.<sup>74</sup> Though underutilized, EPA’s Natural Gas STAR suggests the opportunity to dramatically reduce GHG pollution from oil and gas development, *if* its identified technologies and practices were implemented at the proper scale and supported by EPA’s sister agencies, such as BLM. For calendar year 2010, EPA estimated that this program avoided 38.1 million tons CO<sub>2</sub> equivalent, and added revenue of nearly \$376 million in natural gas sales (at \$4.00/Mcf) – revenue which

---

<sup>71</sup> In this context, the 2010 SIR, while providing a basic literature review of GHG emissions sources, is merely a starting point for BLM’s responsibility to take a hard look at GHG emissions in the context of foreseeable drilling operations in the geologic formations proposed for leasing.

<sup>72</sup> Drew Shindell, et al., *Simultaneously Mitigating Near-Term Climate Change and Improving Human Health and Food Security*, SCIENCE 2012 335, at 183.

<sup>73</sup> See generally, EPA, Natural Gas STAR Program, available at: [www.epa.gov/gasstar/](http://www.epa.gov/gasstar/).

<sup>74</sup> See EPA, Natural Gas STAR Program, *Recommended Technologies and Practices*, available at: [www.epa.gov/gasstar/tools/recommended.html](http://www.epa.gov/gasstar/tools/recommended.html).

translates into additional royalties to federal and state governments for the American public.<sup>75</sup> BLM must identify emission reduction strategies in its NEPA analysis, both to address impacts of the proposed action, as well as to satisfy the requirements of SO 3226, FLPMA, and the MLA.

## **9. Managing for Community and Ecosystem Resiliency.**

In the context of climate change and the many resultant impacts, such as the alteration to the biosphere and impairments to human health, the resiliency of our landscapes and a community's ability to respond and adapt to these changes takes on a new magnitude of importance.

According to experts at the Government Accountability Office ("GAO"), federal land and water resources are vulnerable to a wide range of effects from climate change, some of which are already occurring. These effects include, among others, "(1) physical effects, such as droughts, floods, glacial melting, and sea level rise; (2) biological effects, such as increases in insect and disease infestations, shifts in species distribution, and changes in the timing of natural events; and (3) economic and social effects, such as adverse impacts on tourism, infrastructure, fishing, and other resource uses."<sup>76</sup> There is absolutely no mention, much less analysis, in the in any of the documents to be supplemented by the SEIS of these growing impacts or the necessity to employ climate mitigation measures to ensure landscape and human resiliency and their ability to adapt and respond to climate change impacts.

Beyond mitigating climate change by reducing contributions of GHG pollution to the atmosphere, the BLM can also help promote ecological resiliency and adaptability by reducing external anthropogenic environmental stresses (like coal, oil and gas development) as a way of best positioning public lands, and the communities that rely on those public lands, to withstand what is acknowledged ongoing and intensifying climate change degradation. It is crucial for the BLM to close the gap in their decisionmaking regarding the cumulative contribution of

---

<sup>75</sup> See EPA, Natural Gas STAR Program, *Accomplishments*, available at: [www.epa.gov/gasstar/accomplishments/index.html#three](http://www.epa.gov/gasstar/accomplishments/index.html#three) . BLM should also take a look at EPA's more detailed program accomplishments to provide a measure of what BLM could itself accomplish, and to understand the nature of the problem and opportunities. Also of interest, for calendar year 2008, EPA estimated that its program avoided 46.3 million tons of CO<sub>2</sub> equivalent, equal to the annual GHG emissions from approximately 6 million homes per year, and added revenue of nearly \$802 million in natural gas sales. To speculate, the calendar year 2009 declines are likely associated with ongoing economic and financial stagnation and the low price of natural gas that has slowed natural gas drilling and production.

<sup>76</sup> GAO Report, *Climate Change: Agencies Should Develop Guidance for Addressing the Effects on Federal Land and Water Resources* (2007); see also Committee on Environment and Natural Resources, National Science and Technology Council, *Scientific Assessment of the Effects of Global Climate Change on the United States* (2008); Melanie Lenart, et. al. *Global Warming in the Southwest: Projections, Observations, and Impacts* (2007) (describing impacts from temperature rise, drought, floods and impacts to water supply on the southwest).

coal, oil and gas development made available in the planning area, particularly given the conflict between such authorization and the agency's responsibility to manage for healthy, resilient ecosystems. Although the BLM has recognized the threat of climate change, the agency's decisionmaking is not reflective of this harm and the agency fails to take the many necessary and meaningful steps to ameliorate the impacts to communities, landscapes, and species. The BLM, BIA and SUIT must evaluate the relationship between climate change and these impacts in the SEIS or for the Shale Oil and Gas Development. *See Morris*, 598 F.3d at 681.

Moreover, CEQ Guidance requires that agencies address the impacts of climate change on the environmental consequences of a proposed action. As the CEQ Guidance recognizes, “[c]limate change can increase the vulnerability of a resource, ecosystem, human community, or structure, which would then be more susceptible to climate change and other effects and result in a proposed action’s effects being more environmentally damaging.” 77 Fed. Reg. at 77,828. These effects are already occurring and are expected to increase, resulting in shrinking water resources, extreme flooding events, invasion of more combustible non-native plant species, soil erosion, loss of wildlife habitat, and larger, hotter wildfires. These impacts have been catalogued in recent scientific studies by federal agencies, including the National Climate Assessment,<sup>77</sup> and highlighted by President Obama. *See* Exec. Order No. 13,653, § 1. As the CEQ Guidance recognizes, “GHGs already in the atmosphere will continue altering the climate system into the future, even with current or future emissions control efforts.” 77 Fed. Reg. at 77,829. In other words, climate change impacts are and will continue to be part of the new normal, and “managing th[o]se risks requires deliberate preparation, close cooperation, and coordinated planning ... to improve climate preparedness and resilience; help safeguard our economy, infrastructure, environment, and natural resources; and provide for the continuity of ... agency operations, services, and programs.” Exec. Order No. 13,653, § 1.

NEPA analyses must account for this reality. While the CEQ Guidance suggests that existing and reasonably foreseeable climate change impacts be considered as part of an agency's hard look at impacts, the guidance must also account for the fact that climate change effects are and will continue to be a key component of the environmental baseline. Agencies are required under NEPA to “describe the environment of the areas to be affected or created by the alternatives under consideration.” 40 C.F.R. § 1502.15. The affected environment discussion sets the “baseline” for the impacts analysis and comparison of alternatives. As the Ninth Circuit has recognized, “without establishing...baseline conditions...there is simply no way to determine what effect [an action] will have on the environment, and consequently, no way to comply with NEPA.” *Half Moon Bay Fisherman’s Marketing Ass’n v. Carlucci*, 857 F.2d 505, 510 (9th Cir. 1988) (explaining further that “[t]he concept of a baseline against which to compare predictions of the effects of the proposed action and reasonable alternatives is critical to the NEPA process”).

Excluding climate change effects from the environmental baseline ignores the reality that the impacts of proposed actions must be evaluated based on the already deteriorating, climate-impacted state of the resources, ecosystems, human communities, and structures that will be

---

<sup>77</sup> Available at <http://nca2014.globalchange.gov/>.

affected. Accordingly, BLM, BIA and SUIT must clarify that existing and reasonably foreseeable climate change impacts as part of the affected environment in the planning area, which then must be assessed as part of agency hard look at impacts, and integrated into *each* of the alternatives, including the no action alternative. Put differently, simply acknowledging climate impacts as part of the affected environment is insufficient. BLM, BIA and SUIT must incorporate that information into their hard look at impacts (e.g., the cumulative impact of climate change, the proposed action, and other past, present, and reasonably foreseeable impacts), in particular to help inform the design and consideration of alternatives and mitigation measures.

Critically, the final guidance should emphasize that agencies may not shirk their responsibility to assess climate change merely because of uncertainties. “Reasonable forecasting and speculation is...implicit in NEPA, and we must reject any attempt by agencies to shirk their responsibilities under NEPA by labelling any and all discussion of future environmental effects as ‘crystal ball inquiry.’” *Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1246 n.9 (9<sup>th</sup> Cir. 1984 (quoting *Scientists’ Inst. for Pub. Info., Inc. v. Atomic Energy Comm.*, 481 F.2d 1079, 1092 (D.C. Cir. 1973))). NEPA’s hard look merely requires “a reasonably thorough discussion of the significant aspects of the probable environmental consequences” to “foster both informed decision - making and informed public participation.” *Ctr. for Biological Diversity v. NHTSA*, 538 F.3d 1172, 1194 (9th Cir. 2008) (quotations and citations omitted).

In this context, and to accurately account for and integrate climate change impacts into the affected environment, hard look, alternatives, and mitigation analysis, BLM, BIA and SUIT should evaluate the relevant resources, ecosystems, or communities for key vulnerabilities as part of the baseline assessment. The vulnerability of ecosystems and communities, as well as the species and physical elements they comprise, depends on their inherent qualities and their ability to change or adapt to address new climatic conditions. For example, the vulnerability of certain species can be affected by the tolerance of individual organisms to the direct effects of climate change, the ability of populations to adapt to those conditions through the expression of genetic variability, and the ability to adjust behaviorally to changes in the ecosystem, such as prey shifts. A vulnerability assessment would examine the species and physical elements of existing ecosystems and determine which elements are sensitive, which are resilient, which have the ability to adapt, and what the likely consequences would be of anticipated changes in climate. Human infrastructure—bridges, roads, buildings, etc.—should be assessed similarly.

Because ecosystems (including the human communities that rest within such ecosystems) are so complex, it is impossible to evaluate the vulnerabilities of every population, species, community, or other element of the system in question. Instead, risk assessment must focus on particular, high-priority elements or “key vulnerabilities.” In its 5th Assessment Report, the IPCC suggested the following criteria for identifying key vulnerabilities:

- Exposure of society, community or social-ecological system to climate stressors.
- Importance of vulnerable system(s).

- Limited ability of society, community, or social-ecological systems to cope with and build adaptive capacities or limit the adverse consequences of climate related hazard.
- Persistence of vulnerable conditions and degree of irreversibility of consequences.
- Presence of conditions that make societies highly susceptible to cumulative stressors in complex and multiple-interacting systems.

In other words, key vulnerabilities are likely to occur where the effects of climate change are large and intense, imminent, long lasting, highly probable, irreversible, and likely to limit the distribution of highly valued systems or system elements. BLM, BIA and SUIT should clarify that understanding and assessing these vulnerabilities, based on existing information and tools,<sup>78</sup> is a key component of the affected environment, hard look at impacts, and the design and consideration of alternatives and mitigation measures.

#### **D. The BLM, BIA and SUIT must take a “hard look” at hydraulic fracturing.**

Although advances in oil and gas extraction techniques – namely hydraulic fracturing (in association with horizontal drilling), or fracking – have undoubtedly resulted in a growth of domestic production, the wisdom of these advances with regard to other resource values and human health is still very much in question.<sup>79</sup> As described in detail below, there is a wealth of information and reports stressing the dangers of fracking that must be considered in this NEPA analysis (SEIS). Of course, given the national attention and debate that fracking is generating, significant sources of new information and research are being consistently published warning against the dangers and impacts that fracking can produce, which must also be considered in any legally proficient NEPA analysis.

For example, sobering new research shows that chemically concentrated fracking fluids can migrate into groundwater aquifers within a matter of years – directly refuting industry claims that rock layers separating aquifers are impervious to these pollutants.<sup>80</sup> For years, industry claimed that there has never been a documented case of groundwater contamination from fracking, an assertion that was invalidated by EPA’s research in Pavillion, Wyoming. Indeed, a second round of testing in the Pavillion area was recently performed by the U.S. Geological Survey, which supported EPA’s preliminary findings that hydraulic fracturing resulted in

---

<sup>78</sup> Where there is scientific uncertainty, agencies must satisfy the requirements of 40 C.F.R. § 1502.22.

<sup>79</sup> See, e.g., A.R. Ingraffea, et. al., *Natural Gas, Hydraulic Fracking and a Bridge to Where?* (April 2011).

<sup>80</sup> See, Abrahm Lustgarten, *New Study Predicts Frack Fluids can Migrate to Aquifers Within Years*, PROPUBLICA, May 1, 2012; Josh Fox, *The Sky is Pink: Annotated Documents*.

groundwater contamination.<sup>81</sup> Even in draft form, the Pavillion Report, as discussed below, and its troubling findings – as well as other evidence of fracking related contamination from around the country – underscore the need for thorough analysis to be performed by the BLM, BIA and SUIT in the SEIS.

The dangers and impacts of fracking are not only limited to extraction, but can be found at every stage of the production cycle. For example, fracking's waste stream can result in dramatic impacts – requiring onsite waste injection, trucking frack fluids offsite, and in some cases even the direct release of fracking waste into watercourses – the impacts of which can be compounded by ineffective or nonexistent regulation.<sup>82</sup> As detailed herein, shale gas production itself can be inefficient and wasteful – with practices such as the venting of methane,<sup>83</sup> and the use of vast quantities of water in the fracking process.<sup>84</sup> Thus, in addition to being wasteful, these practices can also be quite harmful to human health and the environment.

The wisdom of the oil and gas boom is further brought into question by the underlying economics driving domestic growth, with a historically low cost of natural gas and a vast number of approved wells that industry has allowed to expire – all of which questions the imminent need for additional public lands to be made available for oil and gas development, often at the expense of other important resource values at stake in an area. However, a closer look at some of the economics motivating the oil and gas industry's push for greater production reveals sheer industry greed and speculation – driven by huge capital investment and Wall Street profits.<sup>85</sup> These factors cannot be ignored by BLM, BIA and SUIT as they embark on their NEPA analysis at a time where the oil and gas industry is in collapse.

---

<sup>81</sup> Peter Wright, et. al., U.S. Geological Survey, *Groundwater-Quality and Quality-Control Data for Two Monitoring Wells near Pavillion, Wyoming*, April and May 2012.

<sup>82</sup> See Abrahm Lustgarten, *The Trillion Gallon Loophole: Lax Rules for Drillers that Inject Pollutants Into the Earth*, PROPUBLICA, Sept. 20, 2012; Earthworks, *The Crisis in Oil & Gas Regulatory Enforcement*, September 2012.

<sup>83</sup> Energy Policy Research Foundation, *Lighting up the Prairie: Economic Considerations in Natural Gas Flaring*, Sept. 5, 2012; see also, James Hansen, et. al., *Greenhouse gas growth rates*, PNAS, vol. 101, no. 46, 16109-16114, Sept. 29, 2004 (curtailing methane waste is seen as a “vital contribution toward averting dangerous anthropogenic interference with global climate.”)

<sup>84</sup> See GAO, *Energy-Water Nexus: Coordinated Federal Approach Needed to Better Manage Energy and Water Tradeoffs* (Sept. 2012); Nicholas Kusnetz, *The Bakken oil play spurs booming business – in water*, High Country News, Sept. 5, 2012.

<sup>85</sup> See Deborah Rogers, *In Their Own Words: Examining Shale Gas Hype*, Energy Policy Forum (April 2012).

## 1. Fracking Impacts

The potential impacts that may result from hydraulic fracturing are myriad and significant; and include, among others, impacts to water quality and supply, impacts to habitat and wildlife, impacts to human health, as well as impacts on greenhouse gas emissions and air quality.<sup>86</sup> The New York Times recently uncovered a 1987 U.S. Environmental Protection Agency (“EPA”) report to Congress which found, among other things, that fracking can cause groundwater contamination, and cites as an example a case where hydraulic fracturing fluids contaminated a water well in West Virginia.<sup>87</sup> The EPA report was further summarized and reviewed in an Environmental Working Group report.<sup>88</sup>

Fracking fluid is a conglomeration of many highly toxic chemicals and compounds. The Endocrine Disruption Exchange (“TEDX”) has documented nearly 1,000 products energy companies inject into the ground in the process of extracting natural gas. Many of these products contain chemicals that are harmful to human health. According to TEDX:

In the 980 products identified...[for use during natural gas operations], there were a total of 649 chemicals. Specific chemical names and CAS numbers could not be determined for 286 (44%) of the chemicals, therefore, the health effects summary is based on the remaining 362 chemicals with CAS numbers...Over 78% of the chemicals are associated with skin, eye or sensory organ effects, respiratory effects, and gastrointestinal or liver effects. The brain and nervous system can be harmed by 55% of the chemicals. These four health effect categories...are likely to appear immediately or soon after exposure. They include symptoms such as burning eyes, rashes, coughs, sore throats, asthma-like effects, nausea, vomiting, headaches, dizziness, tremors, and convulsions. Other effects, including cancer, organ damage, and harm to the endocrine system, may not appear for months or

---

<sup>86</sup> See, e.g., National Wildlife Federation, *No More Drilling in the Dark: Exposing the Hazards of Natural Gas Production and Protecting America’s Drinking Water and Wildlife Habitats* (2011), available at: <http://www.nwf.org/News-and-Magazines/Media-Center/Reports/Archive/2011/No-More-Drilling-in-the-Dark.aspx>; see also United States Forest Service, Chloride Concentration Gradients in Tank-Stored Hydraulic Fracturing Fluids Following Flowback (Nov. 2010), available at: <http://nrs.fs.fed.us/pubs/38533/> (last visited Dec. 20, 2011).

<sup>87</sup> See U.S. Environmental Protection Agency, Report to Congress, *Management of Wastes from the Exploration, Development, and Production of Crude Oil, Natural Gas, and Geothermal Energy* (Dec. 1987), at Ch. IV, Damages Caused by Oil and Gas Operations (attached as Exhibit 78); see also Drilling Down, *Documents: A Case of Fracking Related Contamination*, THE NEW YORK TIMES ONLINE, available at: <http://www.nytimes.com/interactive/us/drilling-down-documents-7.html#document/p1/a27935>.

<sup>88</sup> See Environmental Working Group, *Cracks in the Façade: 25 Years ago, EPA Linked “Fracking” to Contamination* (Aug. 2011), available at: <http://www.ewg.org/reports/cracks-in-the-facade>.

years later. Between 22% and 47% of the chemicals were associated with these possibly longer-term health effects. Forty-eight percent of the chemicals have health effects in the category labeled ‘Other.’ The ‘Other’ category includes such effects as changes in weight, or effects on teeth or bones, for example, *but the most often cited effect in this category is the ability of the chemical to cause death.*<sup>89</sup> (emphasis added)

A Congressional Report issued in April 2011 reveals that energy companies have injected more than 30 million gallons of diesel fuel or diesel mixed with other fluids into the ground nationwide in the process of fracking to extract natural gas between 2005 and 2009.<sup>90</sup> In Colorado, 1.3 million gallons of fluids containing diesel fuel was used in fracking natural gas wells.<sup>91</sup> The EPA has stated that “the use of diesel fuel in fracturing fluids poses the greatest threat” to underground sources of drinking water.<sup>92</sup> According to Congresswoman Diana DeGette of Colorado, fracking with diesel fuel was done without permits in apparent violation of the Safe Drinking Water Act.<sup>93</sup>

In 2012, a former staffer responsible for investigating and managing groundwater contamination for New York State warned that allowing the controversial hydraulic fracturing practices would lead to contamination of the state’s aquifers and poison its drinking water. In staffer Paul Hetzler’s letter to an upstate New York newspaper, he provided:

---

<sup>89</sup> TEDX, *Chemicals In Natural Gas Operations*.

<sup>90</sup> U.S. CONGRESS, HOUSE OF REPRESENTATIVES, COMMITTEE ON ENERGY AND COMMERCE, *Chemicals Used in Hydraulic Fracturing* (April 2011), at 10; *see also* Memorandum from Chairman Henry A. Waxman and Subcommittee Chairman Edward J. Markey, to Committee on Energy and Commerce, *Examining the Potential Impact of Hydraulic Fracturing* (Feb. 28, 2010).

<sup>91</sup> Karen Frantz, *States probe use of diesel fuel*, DURANGO HERALD, February 5, 2011, available at: <http://www.durangoherald.com/article/20110206/NEWS01/702069922/-1/s>.

<sup>92</sup> David O. Williams, *U.S. House probe alleges Halliburton, others illegally used diesel in gas fracking*, COLORADO INDEPENDENT, February 1, 2011, available at: <http://coloradoindependent.com/73593/u-s-house-probe-alleges-halliburton-others-illegally-used-diesel-in-gas-fracking>.

<sup>93</sup> Letter from U.S. CONGRESS, HOUSE OF REPRESENTATIVES, COMMITTEE ON ENERGY AND COMMERCE, Representatives Henry A. Waxman, Edward J. Markey, & Diana DeGette, to Lisa Jackson, Administrator, U.S. ENVIRONMENTAL PROTECTION AGENCY (Jan. 31, 2011), available at: [http://degette.house.gov/index.php?option=com\\_content&view=article&id=1048:energy-a-commerce-committee-fracking-investigation-reveals-millions-of-gallons-of-diesel-fuel-injected-into-ground-across-us&catid=76:press-releases-&Itemid=227](http://degette.house.gov/index.php?option=com_content&view=article&id=1048:energy-a-commerce-committee-fracking-investigation-reveals-millions-of-gallons-of-diesel-fuel-injected-into-ground-across-us&catid=76:press-releases-&Itemid=227); *see also* Environment News Service, *Toxic Diesel Fuel Used Without Permits in Fracking Operations*, February 4, 2011, available at: <http://www.ens-newswire.com/ens/feb2011/2011-02-04-092.html>.



I'm familiar with the fate and transport of contaminants in fractured media, and let me be clear: hydraulic fracturing as it's practiced today will contaminate our aquifers.

Not *might* contaminate our aquifers. Hydraulic fracturing *will* contaminate New York's aquifers. If you were looking for a way to poison the drinking water supply, here in the north-east you couldn't find a more chillingly effective and thorough method of doing so than with hydraulic fracturing.<sup>94</sup>

Despite the energy industry's explanation that a thick layer of bedrock safely separates the gas-containing rock layer being fractured from ground-water used for drinking and surface water sources, evidence is emerging which warns that contaminants from gas wells are making their way into groundwater. This is particularly important, here, as the target Mancos Shale and Lewis Shale formations can be shallow (2,500 feet below ground), heightening this risk to an even greater degree. Evidence suggesting contaminants from drilling operations have migrated towards the surface include:

- In March 2004, gas was discovered bubbling up in West Divide Creek and a few nearby ponds in Garfield County. The Colorado Oil and Gas Conservation Commission ("COGCC") took samples of the water and discovered they contained benzene, toluene, and m- & p-xylenes at concentrations of 99, 100, and 17 micrograms per liter (mg/l), respectively. This indicated that the gas seeping into West Divide Creek probably was not biogenic methane gas (gas made by the decomposition of organic matter by methanotrophic bacteria), but rather thermogenic gas. Further testing indicated that the gas seeping into West Divide Creek was thermogenic gas from the Williams Fork Formation where EnCana had been drilling for natural gas.<sup>95</sup> EnCana was subsequently fined \$371,000 as a result of contaminating West Divide Creek.
- The COGCC investigated complaints from Weld County, Colorado that domestic water wells were allegedly contaminated from oil and gas development. The COGCC concluded after investigation that the Ellsworth's well contained a mixture of biogenic and thermogenic

---

<sup>94</sup> Karen McVeigh, *Damning New Letter from NY State Insider: 'Hydraulic Fracturing as It's Practiced Today Will Contaminate Our Aquifers,'* THE GUARDIAN, January 6, 2012, available at: [http://www.alternet.org/water/153684/damning\\_new\\_letter\\_from\\_ny\\_state\\_insider%3A\\_%27hydraulic\\_fracturing\\_as\\_it%27s\\_practiced\\_today\\_will\\_contaminate\\_our\\_aquifers%27/](http://www.alternet.org/water/153684/damning_new_letter_from_ny_state_insider%3A_%27hydraulic_fracturing_as_it%27s_practiced_today_will_contaminate_our_aquifers%27/).

<sup>95</sup> Colorado Oil and Gas Conservation Commission, *Mamm Creek Gas Field - West Divide Creek Gas Seep – April 14, 2004 Update* (2004), available at: [http://cogcc.state.co.us/Library/PiceanceBasin/WestDivide4\\_14\\_04summary.htm](http://cogcc.state.co.us/Library/PiceanceBasin/WestDivide4_14_04summary.htm); see also Margaret Ash, Environmental Protection Supervisor, Colorado Oil and Gas Conservation Commission, *Investigation into Complaint of New Gas Seep, West Divide Creek, 2007-2008*.

methane (from gas drilling operations) that was in part attributable to oil and gas development. Ms. Ellsworth and the operator reached a settlement in that case.<sup>96</sup>

- In 2007, EPA hydrologists sampled a pristine drinking water aquifer under the Jonah Well Field near Pinedale, Wyoming. They found high levels of benzene, a known carcinogen, in 3 wells and low levels of hydrocarbons in an additional 82 wells (out of the 163 wells sampled).<sup>97</sup> These contaminated wells are located in an area stretching across 28 miles in an undisturbed landscape in which the only industry that exists is natural gas extraction.
- In Pavillion, Wyoming, EPA found 11 of 39 water samples collected from domestic wells were contaminated with chemicals linked to local natural gas fracking operations. The EPA found arsenic, methane gas, diesel-fuel-like compounds and metals including copper and vanadium. Of particular concern were compounds called adamantanes – a natural hydrocarbon found in natural gas – and a little-known chemical called 2-butoxyethanol phosphate, or 2-BEp. 2-BEp is closely related to 2-BE, a substance known to be used in fracking fluids.<sup>98</sup>
- Pennsylvania state regulators have uncovered more than 50 cases where methane and other contaminants have exploded out of wells or leaked underground into drinking water supplies.<sup>99</sup>

Known and suspected adverse effects of drilling operations include:

- Garfield County, Colorado, Commissioners recently expressed their health and safety concerns regarding natural gas drilling by stating in a legal filing that, “No agency...can guarantee Garfield County residents that exposures to oil and gas emissions will not produce illness or latent effects, including death.” They cited the cases of three people – Chris Mobaldi, Verna Wilson, and Jose Lara – who died after suffering from drilling-related illnesses in Garfield County.<sup>100</sup>

---

<sup>96</sup> Letter from David Neslin, Director, Colorado Oil and Gas Conservation Commission, to Mr. and Mrs. Ellsworth (August 7, 2009).

<sup>97</sup> BLM Wyoming News Release, *BLM, Wyoming DEQ Require Test of Water Wells Within the Pinedale Anticline and Jonah Fields* (April 26, 2007), available at: [http://www.blm.gov/wy/st/en/info/news\\_room/2007/04/26pfo-DEQ-BLMwatertests.html](http://www.blm.gov/wy/st/en/info/news_room/2007/04/26pfo-DEQ-BLMwatertests.html).

<sup>98</sup> See Neslin.

<sup>99</sup> See Robert B. Jackson, et al., *Increased stray gas abundance in a subset of drinking water wells near Marcellus shale gas extraction*, PNAS, December 17, 2012.

<sup>100</sup> David O. Williams, *GarCo officials blast state gas drilling rules in case requesting more well density*, THE COLORADO INDEPENDENT, January 19, 2011, available at: <http://coloradoindependent.com/72246/garco-officials-blast-state-gas-drilling-rules-in-case-requesting-more-well-density>.

- In April 2008, a nurse at a hospital in Durango, Colorado, became critically ill and almost died of organ failure as a result of second-hand chemical exposure acquired while treating a drill rig worker who had fracking fluid on his clothes.<sup>101</sup>
- In Texas, which now has approximately 93,000 natural-gas wells, up from around 58,000 a dozen years ago, a hospital system in the six counties with some of the heaviest drilling reported in 2010 a 25 percent asthma rate for young children, more than three times the state rate of about 7 percent.<sup>102</sup>
- A house in Bainbridge, Ohio exploded on November 15, 2007. The Ohio Department of Natural Resources attributed the explosion to a methane leak from a nearby hydraulic fractured well. The faulty cement casing of the well developed a crack allowing methane to seep underground and fill the couple's basement.<sup>103</sup>

Abraham Lustgarten, an investigative reporter with ProPublica, who has won the George Polk Award for Environmental Reporting for his work on the dangers of natural gas drilling, writes:

Dennis Coleman, a leading international geologist and expert on tracking underground migration, says more data must be collected before anyone can say for sure that drilling contaminants have made their way to water or that fracturing is to blame. But Coleman also says there's no reason to think it can't happen. Coleman's Illinois-based company, Isotech Laboratories, has both the government and the oil and gas industry as clients. He says he has seen methane gas seep underground for more than seven miles from its source. If the methane can seep, the theory goes, so can the fluids.<sup>104</sup>

---

<sup>101</sup> Eric Frankowski, *Gas industry secrets and a nurse's story*, HIGH COUNTRY NEWS, July 28, 2008, available at: <http://www.hcn.org/wotr/gas-industry-secrets-and-a-nurses-story>.

<sup>102</sup> Ian Urbina, *Regulations Lax as Gas Well's Tainted Waters Hits Rivers*, THE NEW YORK TIMES, February 26, 2011, available at: <http://www.nytimes.com/2011/02/27/us/27gas.html?pagewanted=all>.

<sup>103</sup> See Ohio Department of Natural Resources, Division of Mineral Resources Management, *Report on the Investigation of the Natural Gas Invasion of Aquifers in Bainbridge Township of Geauga County, Ohio* (September 1, 2008); see also Joan Demirjian, *Insurance company [sues] driller over home explosion*, CHAGRIN VALLEY TIMES, January 7, 2010, available at: <http://www.chagrinvallleytimes.com/NC/0/1571.html>.

<sup>104</sup> Abraham Lustgarten, *Hydrofracked? One Man's Mystery Leads to a Backlash Against Natural Gas Drilling*, PROPUBLICA, February 25, 2011, available at: <http://www.propublica.org/article/hydrofracked-one-mans-mystery-leads-to-a-backlash-against-natural-gas-drill/single>.

However, perhaps the most thorough evidence of groundwater contamination from hydraulic fracturing is found in a newly released EPA draft report investigating ground water contamination near Pavillion, Wyoming (“Pavillion Report”).<sup>105</sup> Among its findings, the Pavillion Report provides:

Elevated levels of dissolved methane in domestic wells generally increase in those wells in proximity to gas production wells. Pavillion Report, at xiii.

Detection of high concentrations of benzene, xylenes, gasoline range organics, diesel range organics, and total purgeable hydrocarbons in ground water samples from shallow monitoring wells near pits indicates that pits are a source of shallow ground water contamination in the area of investigation. Pits were used for disposal of drilling cuttings, flowback, and produced water. There are at least 33 pits in the area of investigation. When considered separately, pits represent potential source terms for localized ground water plumes of unknown extent. When considered as whole they represent potential broader contamination of shallow ground water. *Id.* at 33 (emphasis added).

The explanation best fitting the data for the deep monitoring wells is that constituents associated with hydraulic fracturing have been released into the Wind River drinking water aquifer at depths above the current production zone. *Id.* (emphasis added).

Although some natural migration of gas would be expected above a gas field such as Pavillion, data suggest that enhanced migration of gas has occurred to ground water at depths used for domestic water supply and to domestic wells. *Id.* at 37 (emphasis added).

A lines of reasoning approach utilized at this site best supports an explanation that inorganic and organic constituents associated with hydraulic fracturing have contaminated ground water at and below the depth used for domestic water supply.... A lines of evidence approach also indicates that gas production activities have likely enhanced gas migration at and below depths used for domestic water supply and to domestic wells in the area of investigation. *Id.* at 39 (emphasis added).

Although the Pavillion Report is currently released as a “draft,” the EPA has shared preliminary data with, and obtained feedback from, Wyoming state officials, EnCana, Tribes, and Pavillion residents, prior to release. Even in draft form, the Pavillion Report and its troubling findings – as well as other evidence of fracking related contamination from around the country – satisfies the low threshold for consideration of the impacts described therein in the preparation of the SEIS.

---

<sup>105</sup> EPA Draft Report, *Investigation of Ground Water Contamination Near, Pavillion, Wyoming* (Dec. 2011).

Historically, BLM has been dismissive of possible impacts to water quality from hydraulic fracturing. However, given the weight of both new and old evidence documenting the risk of water contamination from gas drilling across the country, BLM's approach is becoming increasingly untenable, in particular given the absence of any scientific analysis that conclusively finds that these documented problems do not exist in the area of the proposed lease sale. Indeed, even an industry report prepared for Gunnison Energy Corporation – a major oil and gas developer – has acknowledged the potential for significant impacts to water resources from fracking.<sup>106</sup> The simple fact of the matter is that natural gas development has the potential for poisoning our water with toxic, hazardous, and carcinogenic chemicals as well as naturally occurring radioactive radium, and BLM (as well as BIA and SUIT) must provide a thorough hard look analysis of these potentially significant impacts in its analysis for the SEIS.

Recent reporting from New Mexico (BLM Farmington Field Office) has acknowledged a proliferation of “frack hits,” or “downhole communication,” where new horizontal drilling for oil is communicating with both historic and active vertical wells.<sup>107</sup> This is a significant development that could result in well blowouts, contamination of resources, and issues over who is responsible for liabilities and costs of such impacts. BLM, BIA and SUIT have a significant responsibility to include frack hits in the SEIS particularly given the historic preponderance of conventional and CBM wells, as well as critical groundwater and surface water resources (including Navajo Reservoir and San Juan River, Pine River, Animas River, La Plata River) in the proposed project area.

The bottom line is this – energy companies have told us, ‘Trust us, our fracking ingredients and process for extracting natural gas are harmless.’ We now know they have not been truthful and cannot be trusted. Without implementation of a precautionary approach to these risks, BLM, BIA and SUIT could place the health of our community and our environment at risk with their plan for 1,534 new shale oil and gas wells.

### **3. Disclosure Rules**

One basic purpose of NEPA is to assure that the public and policy makers are aware in advance of the potential environmental consequences of proposed actions. 40 C.F.R. § 1500.1(a). Furthermore, the presence of uncertain or unknown risks may compel an agency to prepare a more thorough EIS. 40 C.F.R. § 1508.27(b)(5). Currently, there are significant uncertainties about the different chemicals that are being used in hydraulic fracturing, though, as mentioned above, it is clear that toxic, hazardous, and carcinogenic chemicals are used throughout the

---

<sup>106</sup> See Gunnison Energy Corporation, *Analysis of Potential Impacts of Four Exploratory Natural Gas Wells to Water Resources of the South Flank of the Grand Mesa, Delta County, Colorado* (March 2003) at 42, 56.

<sup>107</sup> See, e.g., Gayathri Vaidyanathan, *In N.M., a sea of 'frack hits' may be tilting production*, E&E News, (March 18, 2014) (attached as Exhibit 118); Tina Jensen, *Fracking fluid blows out nearby well*, KQRE (October 19, 2013).

fracking process. Current, disclosure of fracking chemicals, via FracFocus, is insufficient to adequately protect the public from potentially toxic, hazardous, and/or carcinogenic chemicals.<sup>108</sup> In preparing its NEPA analysis for SEIS, BLM, BIA and SUI must catalogue the substances that will be used or are reasonably likely to be used in fracking on the entire project area where wells may be located. In order to make this information accessible to the public, BLM, BIA and SUI should categorize these substances as hazardous, toxic, carcinogenic, or benign.

#### 4. Seismic Impacts

The scientific communities recognition of the relationship between hydraulic fracturing and seismic activity is not new. Indeed, the United States Geological Survey (USGS) freely admits, “earthquakes induced by human activity have been documented.”<sup>109</sup> The largest and perhaps most widely known incident to date resulted from fluid injection at the Rocky Mountain Arsenal near Denver, Colorado, in 1967, where an earthquake of magnitude 5.5 followed a series of smaller earthquakes. Further, in a 1990 report studying the incident, the USGS confirmed, “the link between fracking fluid injection and the earlier series of earthquakes was established.”<sup>110</sup>

Recently, “[a] northeast Ohio well used to dispose of wastewater from oil and gas drilling almost certainly caused a series of 11 minor quakes in the Youngstown area since last spring, a seismologist investigating the quakes said.”<sup>111</sup> After the latest and largest quake Saturday, December 31, 2011, which registered at 4.0 magnitude, “state officials announced their beliefs that injecting wastewater near a fault line had created enough pressure to cause seismic activity. They said four inactive wells within a five-mile radius of the Youngstown well would remain closed.”<sup>112</sup> As Andy Ware, deputy director of the Ohio Department of Natural Resources, which

---

<sup>108</sup> Kate Konschnik *et al.*, *Legal Fractures in Chemical Disclosure Laws: Why the Voluntary Chemical Disclosure Registry FracFocus Fails as a Regulatory Compliance Tool*, Harvard Law School, Envtl. Law Program, Apr. 2013.

<sup>109</sup> See USGS, Earthquakes Hazards Program, FAQs, available at: <http://earthquake.usgs.gov/learn/faq/?categoryID=1&faqID=1>.

<sup>110</sup> Craig Nicholson and Robert Wesson, *Earthquake Hazard Associated with Deep Well Injection – A report to the U.S. Environmental Protection Agency*, U.S. Geological Survey Bulletin 1951 (1990), at 74 (also citing other well-documented examples of seismic activity induced by fluid injection, including: Denver, Colorado; Rangely, Colorado; southern Nebraska; western Alberta and southwestern Ontario, Canada; western New York; New Mexico; and Matsushiro, Japan).

<sup>111</sup> Thomas J. Sheeran, *Ohio Earthquakes Caused by Drilling Wastewater Well, Experts Say*, HUFFINGTON POST, January 2, 2012, available at: [http://www.huffingtonpost.com/2012/01/02/ohio-earthquakes-caused-by-wastewater-well-drilling\\_n\\_1180094.html](http://www.huffingtonpost.com/2012/01/02/ohio-earthquakes-caused-by-wastewater-well-drilling_n_1180094.html).

<sup>112</sup> *Id.*

regulates gas drilling and disposal wells, stated, “the state asked on Friday that injection at the well be halted after analysis of the 10th earthquake, a 2.7-magnitude temblor on Dec. 24, showed that it occurred less than 2,000 feet below the well.”<sup>113</sup>

The events in Youngstown unfortunately don’t seem to be isolated. “A string of mostly small tremors in Arkansas, Oklahoma, Texas, British Columbia and other shale-gas-producing areas suggest that [fracking] may lead, directly or indirectly, to a dangerous earthquake.”<sup>114</sup> The commonality of circumstances suggests that a strong correspondence between seismic activity and development techniques used by the oil and gas industry does indeed exist. For example, “[t]he number and strength of earthquakes in central Arkansas have noticeably dropped since the shutdown of two injection wells in the area.”<sup>115</sup> Scott Ausbrooks, the Geohazards Supervisor for the Arkansas Geological Survey, provided, “[w]e have definitely noticed a reduction in the number of earthquakes, especially the larger ones. It’s definitely worth noting.”<sup>116</sup>

Moreover, the U.S. Geological Survey (“USGS”) has recently released a report that links a series of earthquakes in Oklahoma, in January 2011, to a fracking operation underway there. The USGS determined after analyzing earthquake data that “the character of seismic recordings indicate that they are both shallow and unique.”<sup>117</sup> The report continues, providing: “Our analysis showed that shortly after hydraulic fracturing began small earthquakes started occurring, and more than 50 were identified, of which 43 were large enough to be located. Most of these earthquakes occurred within a 24-hour period after hydraulic fracturing operations had ceased.”<sup>118</sup>

In August 2011, an earthquake measuring 5.3-magnitude near Trinidad, Colorado, was the largest in more than 40 years.<sup>119</sup> However, seismic activity near Trinidad is not new. Indeed,

---

<sup>113</sup> Henry Fountain, *Disposal Halted at Well After New Quake in Ohio*, THE NEW YORK TIMES, Jan. 1, 2012, available at: <http://www.nytimes.com/2012/01/02/science/earth/youngstown-injection-well-stays-shut-after-earthquake.html?scp=3&sq=fracking%20earthquake&st=cse>.

<sup>114</sup> *Id.*

<sup>115</sup> Sarah Eddington, *Ark. Quakes Decline Since Injection Well Closures*, HUFFINGTON POST, March 14, 2011, available at: <http://www.huffingtonpost.com/huff-wires/20110314/us-arkansas-earthquakes/>.

<sup>116</sup> *Id.*

<sup>117</sup> Austin Holland, Oklahoma Geological Survey, Examination of Possibly Induced Seismicity from Hydraulic Fracturing in Eola Field, Garvin County, Oklahoma (Aug. 2011), at 1.

<sup>118</sup> *Id.*

<sup>119</sup> Jordan Steffen, *5.3 quake in Trinidad, Colo., area unnerves regions residents*, DENVER POST, August 24, 2011, available at: [http://www.denverpost.com/news/ci\\_18744329](http://www.denverpost.com/news/ci_18744329).

a September 2001 swarm of earthquakes near Trinidad prompted a U.S. Geological Survey investigation. The USGS report provided, “In recent years, a large volume of excess water that is produced in conjunction with coal-bed methane gas production has been returned to the subsurface in fluid disposal wells in the area of the earthquake swarm;” and later continues, “Because of the proximity of these disposal wells to the earthquakes, local residents and officials are concerned that the fluid disposal might have triggered the earthquakes.”<sup>120</sup> The USGS investigation concluded: “the characteristics of the seismicity and the fluid disposal process do not constitute strong evidence that the seismicity is induced by the fluid disposal, though they do not rule out this possibility.”<sup>121</sup>

The threat of seismic activity induced from oil and gas development practices must be considered in the SEIS. As noted above, Ohio officials placed a five-mile buffer around waste injection wells. Given the recognized correlation between oil and gas development practices and the inducement of earthquakes, taking such a precautionary approach, here, through required stipulations are prudent and would help stem potential future impacts. At the very least, however, BLM, BIA and SUIT must take a hard look at possible seismicity impacts from the proposed action.

**E. The BLM, BIA and SUIT must take a “hard look” at impacts to human health.**

As introduced above, emissions from oil and gas development are not limited only to combustion, rather they occur throughout the chain of production – with some of the greatest emissions occurring at the point of extraction. These impacts are a consequence of various stages of oil and gas development – from the drilling and fracking of oil and gas wells, to air quality impacts and the release of hazardous emissions. The BLM, BIA and SUIT must sufficiently address and analyze these impacts in the SEIS.

The implementation of methane waste mitigation technologies, as discussed above, can not only help spur economic benefit, but they can also allay some of the harmful health effects that have come as a consequence of the oil and gas industry boom. Not only do these emissions impact air quality,<sup>122</sup> but they also can result in significant increases in ground-level ozone, and, consequently, have a dramatic impact on human health.<sup>123</sup> For example, ozone has been shown

---

<sup>120</sup> Mark E. Mermonte, et al., USGS, *Investigation of an Earthquake Swarm Near Trinidad, Colorado, August – October 2001* (2002), available at: <http://pubs.usgs.gov/of/2002/ofr-02-0073/ofr-02-0073.html>.

<sup>121</sup> *Id.*

<sup>122</sup> See, e.g., Colorado Department of Public Health and Environment, *2010 Air Quality Data Report* (2010).

<sup>123</sup> See, e.g., GAO Report, *Oil and Gas: Information on Shale Resources, Development, and Environmental and Public Health Risks* (Sept. 2012); GAO Report, *Unconventional Oil and Gas*



to decrease lung function – particularly in adolescents and young adults – as well as increase the risk of death from respiratory causes.<sup>124</sup>

The EPA is currently proposing standards to reduce air pollution from oil and natural gas drilling operations. According to the EPA, the oil and gas industry is “the largest industrial source of emissions of volatile organic compounds (“VOCs”), a group of chemicals that contribute to the formation of ground-level ozone (smog).”<sup>125</sup> Moreover, “[e]xposure to ozone is linked to a wide range of health effects, including aggravated asthma, increased emergency room visits and hospital admissions, and premature death.”<sup>126</sup> In addition to VOCs, the oil and natural gas industry is also “a significant source of emission of methane,” as well as “[e]missions of air toxics such as benzene, ethylbenzene, and n-hexane,” which are “pollutants known, or suspected of causing cancer and other serious health effects.”<sup>127</sup> The EPA reports that the oil and gas industry “emits 2.2 million tons of VOCs, 130,000 tons of air toxics, and 16 million tons of greenhouse gases (methane) each year (40% of all methane emission in the U.S.). The industry is one of the largest sources of VOCs and sulfur dioxide emissions in the United States.”<sup>128</sup> The rapid development of high volume/horizontal drilling in conjunction with hydraulic fracturing has driven expansion of new sources resulting in increased emissions – a change that requires consideration in the SEIS. Notably, EPA has, thus far, decided that it will not regulate methane emissions directly, suggesting an important and necessary role for BLM. Rule-making continues

---

*Development: Key Environmental and Public Health Requirements* (Sept. 2012); Earthworks, *Natural Gas Flowback: How the Texas Natural Gas Boom Affects Health and Safety* (April 2012); Green River Alliance, *Healthy Air Questionnaire Final Report: Clean Air and Healthy Communities* (2011); Lisa McKenzie, Ph.D., et. al., *Human health and risk assessment of air emissions from development of unconventional natural gas resources* (Feb. 2012); Lisa McKenzie, Ph.D., Testimony on: *Federal Regulation: Economic, job, and energy security implications of federal hydraulic fracturing regulation*, May 2, 2012; Earthworks, *Gas Patch Roulette: How Shale Gas Development Risks Public Health in Pennsylvania*, October 2012.

<sup>124</sup> See Ira B. Tager, et. al., *Chronic Exposure to Ambient Ozone and Lung Function in Young Adults*, EPIDEMIOLOGY, Vol. 16, No. 6 (Nov. 2005); Michael Jarrett, Ph.D., et. al., *Long-Term Ozone Exposure and Mortality*, THE NEW ENGLAND JOURNAL OF MEDICINE, 360: 1085-95 (2009)

<sup>125</sup> EPA, *Oil and Natural Gas Pollution Standards: Basic Information, Emissions from the Oil & Natural Gas Industry* (2011), available at: <http://www.epa.gov/airquality/oilandgas/basic.html>; see also Cally Carswell, *Cracking the ozone code – Utah’s gas fields*, HIGH COUNTRY NEWS, Sept. 4, 2012.

<sup>126</sup> See EPA, *Pollution Standards* (fn. 101).

<sup>127</sup> *Id.*

<sup>128</sup> Letter from American Lung Association, American Public Health Association, American Thoracic Society, Asthma and Allergy Foundation of America, and Trust for America’s Health to Lisa Jackson, Administrator, U.S. Environmental Protection Agency (Nov. 30, 2011), at 4.

in determining if EPA regulation of methane will apply to existing oil and gas sources, an enormous factor in the Four Corners region.

Many of the impacts to human health have already been documented in communities subject to industrial scale oil and gas development. For example, in Garfield County, Colorado, residents there have experienced health effects they believe to be caused from oil and gas development. “Community concerns range from mild complaints such as dizziness, nausea, respiratory problems, and eye and skin irritation to more severe concerns including cancer.”<sup>129</sup> Additionally, the community has “environmental concerns related to noise, odors, dust, and ‘toxic’ chemicals in water and air.”<sup>130</sup> After a thorough review of ambient air data across Garfield County, ATSDR determined that, “considering both theoretical cancer risks as well as non-cancer health effects and the uncertainties associated with the available data, it is concluded that the exposures to air pollution in Garfield County pose an indeterminate public health hazard for current exposures.”<sup>131</sup> ATSDR further provided that “estimated theoretical cancer risks and non-cancer hazards for benzene [in the community], which is within the oil and gas development area, appear significantly higher than those in typical urban and rural area, causing some potential concern,” and later concluded that “[t]hese elevated levels are an indicator of the increased potential for health effects related to benzene exposure ... in the oil and gas development area.”<sup>132</sup>

Unfortunately, impacts to human health are not limited only to shale oil and gas emissions, but can result from exposure to chemicals necessary for oil and gas extraction – namely, the hundreds of chemicals used in hydraulic fracturing.<sup>133</sup> Indeed, “[b]etween 2005 and 2009, the 14 oil and gas service companies [analyzed by Congress] used more than 2,500 hydraulic fracturing products containing 750 chemicals and other components. Overall, these companies used 780 million gallons of hydraulic fracturing products – not including water added at the well site – between 2005 and 2009.”<sup>134</sup> Chemical components include BTEX compounds –

---

<sup>129</sup> U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (“ATSDR”), *Health Consultation: Garfield County, Public Health Implications of Ambient Air Exposures to Volatile Organic Compounds as Measured in Rural, Urban, and Oil & Gas Development Areas* (2008), at 1.

<sup>130</sup> *Id.*

<sup>131</sup> *Id.*

<sup>132</sup> *Id.*

<sup>133</sup> See Theo Colborn, et. al., *Comments to the Bureau of Land Management, Uncompahgre Field Office*, THE ENDOCRINE DISRUPTION EXCHANGE, April 20, 2012 (attached as Exhibit 106); Theo Colborn, et. al., *Natural Gas Operations from a Public Health Perspective*, HUMAN AND ECOLOGICAL RISK ASSESSMENT, 17: 1039-1056 (2011).

<sup>134</sup> UNITED STATES HOUSE OF REPRESENTATIVES, COMMITTEE ON ENERGY AND COMMERCE, *Chemicals Used in Hydraulic Fracturing* (April 2011).

benzene, toluene, xylene, and ethylbenzene – which are hazardous air pollutants and known human carcinogens. As BLM, BIA and SUIT proceeds with the SEIS, it must consider the human health impacts associated with these extractive practices.

Leading doctors and scientists studying these issues recognize the unknown risks inherent to fracking. “We don’t know the chemicals that are involved, really; we sort of generally know,” Vikas Kapil, chief medical officer at National Center for Environmental Health, part of the U.S. Centers for Disease Control and Prevention, said at a conference on hydraulic fracturing.<sup>135</sup> “We don’t have a great handle on the toxicology of fracking chemicals.”<sup>136</sup> Christopher Portier, director of the CDC’s National Center for Environmental Health and Agency for Toxic Substances and Disease Registry further provided that “additional studies should examine whether wastewater from wells can harm people or the animals and vegetables they eat.”<sup>137</sup> “We do not have enough information to say with certainty whether shale gas drilling poses a threat to public health.”<sup>138</sup>

Indeed, a new study demonstrates that animals, especially livestock, are sensitive to the contaminants released into the environment by drilling and by its cumulative impacts.<sup>139</sup> Because animals often are exposed continually to air, soil, and groundwater and have more frequent reproductive cycles, animals can be used to monitor potential impacts to human health – they are shale gas drilling’s “canary in the coalmine.” The study evaluated all available fracking-related reports on sick or dying animals. Although secrecy surrounds the fracking industry, “a few ‘natural experiments’ have provided powerful evidence that fracking can harm animals.”<sup>140</sup> For example:

---

<sup>135</sup> Alex Wayne, *Fracking Moratorium Urged by U.S. Doctors Until Health Studies Conducted*, BLOOMBERG NEWS, January 9, 2012, available at: <http://www.bloomberg.com/news/2012-01-09/fracking-moratorium-urged-by-u-s-doctors-until-health-studies-conducted.html>.

<sup>136</sup> *Id.*

<sup>137</sup> Alex Wayne and Katarzyna Klimasinska, *Health Effects of Fracking for Natural Gas Need Study, Says CDC Scientist*, BLOOMBERG NEWS, January 4, 2012, available at: <http://www.bloomberg.com/news/2012-01-04/health-effects-of-fracking-for-natural-gas-need-study-says-cdc-scientist.html>.

<sup>138</sup> *Id.*

<sup>139</sup> Michelle Bamberger and Robert E. Oswald, *Impacts of Gas Drilling on Human and Animal Health*, NEW SOLUTIONS, VOL. 22(1) 51-77 (2012).

<sup>140</sup> See Peter Montague, *Why Fracking and Other Disasters Are So Hard to Stop*, HUFFINGTON POST, Jan. 20, 2012, available at: [http://www.huffingtonpost.com/peter-montague/why-fracking-and-other-di\\_b\\_1218889.html](http://www.huffingtonpost.com/peter-montague/why-fracking-and-other-di_b_1218889.html) (last visited Jan. 23, 2012).

Two cases involving beef cattle farms inadvertently provided control and experimental groups. In one case, a creek into which wastewater was allegedly dumped was the source of water for 60 head, with the remaining 36 head in the herd kept in other pastures without access to the creek. Of the 60 head that were exposed to the creek water, 21 died and 16 failed to produce calves the following spring. Of the 36 that were not exposed, no health problems were observed, and only one cow failed to breed. At another farm, 140 head were exposed when the liner of a wastewater impoundment was allegedly slit, as reported by the farmer, and the fluid drained into the pasture and the pond used as a source of water for the cows. Of those 140 head exposed to the wastewater, approximately 70 died and there was a high incidence of stillborn and stunted calves. The remainder of the herd (60 head) was held in another pasture and did not have access to the wastewater; they showed no health or growth problems. These cases approach the design of a controlled experiment, and strongly implicate wastewater exposure in the death, failure to breed, and reduced growth rate of cattle.<sup>141</sup>

The health problems and uncertainties that proliferate in communities where oil and gas development takes place warrants the further collection of data and research, as contemplated under NEPA, before such development can be made possible through the authorization of development through the SEIS. NEPA requires a hard look at these impacts.

**F. The BLM, BIA and SUIT must take a “hard look” at impacts to water resources.**

**1. Groundwater Impacts**

The oil and gas development authorized through the SEIS will result in significant potential to contaminate groundwater resources and surface water resources in the planning area. In addition to those impacts to groundwater from hydraulic fracturing, as discussed above, such contamination may result during the following processes: (1) the state of chemical mixing due to spills, leaks, and transportation accidents; (2) during the fracking process due to well malfunctions, migration of fracking fluids or fluids from the fractured formation to aquifers, and mobilization of subsurface materials to aquifers; (3) during flowback due to releases, leakage of on-site storage, and spills from pits (caused by improper construction, maintenance, or closure); and (4) during wastewater disposal due to discharges of wastewater into groundwater, incomplete treatment, and transportation accidents.<sup>142</sup> Fracking chemicals and wastewater may also contaminate groundwater supplies as a result of illegal dumping.<sup>143</sup> As discussed above, not

---

<sup>141</sup> See Bamberger at 60.

<sup>142</sup> See U.S. Environmental Protection Agency, *Draft Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources* (Feb. 2011).

<sup>143</sup> Nicholas Kusnetz, *North Dakota’s Oil Boom Brings Damage Along with Prosperity*, PROPUBLICA, July 7, 2012, available at: <http://www.propublica.org/article/the-other-fracking-north-dakotas-oil-boom-brings-damage-along-with-prosperi#>.

all chemical used in fracking have been fully disclosed, but many of those that have been disclosed or discovered are toxic, hazardous, or harmful to human health or welfare. Despite a general lack of adequate oversight of fracking operations, various instances of water pollution from fracking operations have been documented.<sup>144</sup>

Here, in preparing its NEPA analysis of Shale Oil and Gas Development, BLM, BIA and SUIT must address the direct, indirect, and cumulative impacts to groundwater, 40 C.F.R. § 1508.25(c), giving particular scrutiny to the potential for contamination of groundwater supplies.

## **2. Surface Water Impacts**

Given the potential impacts to the San Juan River basin, the Pine River, the Animas River and the Navajo Reservoir, it is critical that water quality issues be given extensive analysis in the SEIS. The analysis should analyze conditions in the project area as they relate to Colorado River Basin water.

## **3. Antidegradation**

Section 303 of the Clean Water Act (“CWA”), 33 U.S.C. § 1313, requires each State to institute comprehensive standards establishing water quality goals for all intrastate waters, and requires that such standards “consist of the designated uses of the navigable waters involved and the water quality criteria for such waters based upon such uses.” 33 U.S.C. § 1313(c)(2)(A). A 1987 amendment to the CWA makes clear that section 303 also contains an “antidegradation policy” – that is, a policy requiring that state standards be sufficient to maintain existing beneficial uses of navigable waters, preventing their further degradation. 33 U.S.C. § 1313(d)(4)(B); *see also PUD No. 1 of Jefferson County v. Washington Dept. of Ecology*, 511 U.S. 700, 705 (1994). Accordingly, EPA’s regulations implementing the CWA require that state water quality standards include “a statewide antidegradation policy” to ensure that “[e]xisting instream water uses and the level of water quality necessary to protect [those] uses [are] maintained and protected.” 40 C.F.R. § 131.12(a)(1). At a minimum, state water quality standards must satisfy these conditions. The CWA also allows States to impose more stringent water quality controls. *See* 33 U.S.C. §§ 1311(b)(1)(C), 1370; *see also* 40 CFR § 131.4(a) (“As recognized by section 510 of the Clean Water Act [33 U.S.C. § 1370], States may develop water quality standards more stringent than required by this regulation”). BLM also holds independent authority to protect water quality above and beyond what the CWA may require or authorize. 43 U.S.C. §§ 1701(a)(8), 1702(c), 1732(b).

---

<sup>144</sup> *See, e.g., id.* (reporting on lack of oversight); Western Organization of Resource Councils, *Gone for Good: Fracking and Water Loss in the West* (2013) at 17-18, 31 (noting lack of state oversight).

The water quality standards that Congress required the States to develop must include three elements: (1) first, each water body must be given a “designated use,” such as recreation or the protection of aquatic life; (2) second, the standards must specify for each body of water the amounts of various pollutants or pollutant parameters that may be present without impairing the designated use; and (3) third, each state must adopt an **antidegradation review policy** which will allow the State to assess activities that may lower the water quality of the water body. *See American Wildlands v. Browner*, 260 F.3d 1192, 1194 (10<sup>th</sup> Cir. 2001) (citing 33 U.S.C. § 1313(c)(2)(A) and 40 C.F.R. §§ 130.3, 130.10(d)(4), 131.6, 131.10, 131.11).

In its NEPA analysis, BLM, BIA and SUIT must address whether the development of oil and gas resources will affect any high quality waters or whether it will degrade any existing uses. BLM, BIA and SUIT may not evade their NEPA duty to consider these impacts by asserting that other agencies may issue discharge permits. 40 C.F.R. §§ 1502.14(f), 1502.16(h). “A non-NEPA document – let alone one prepared and adopted by a state government – cannot satisfy a federal agency’s obligations under NEPA.” *South Fork Band Council of Western Shoshone of Nevada v. U.S. Department of Interior*, 588 F.3d 718, 726 (9<sup>th</sup> Cir. 2009) (citing *Klamath-Siskiyou Wildlands Center v. BLM*, 387 F.3d 989, 998 (9<sup>th</sup> Cir. 2004)) (BLM’s argument that it need not consider impacts because a facility operated under a state permit issued pursuant to the Clean Air Act is “without merit”); *Southern Or. Citizens Against Toxic Sprays, Inc. v. Clark*, 720 F.2d 1475 (9<sup>th</sup> Cir. 1983) (another agency’s consideration of environmental impacts does not relieve BLM of its duty to consider effects; “BLM must assess independently [the impacts]”); *see also Calvert Cliffs’ Coordinating Comm., Inc. v. U. S. Atomic Energy Comm’n*, 449 F.2d 1109, 1123 (D.C. Cir. 1971) (“Certification by another agency that its own environmental standards are satisfied involves an entirely different kind of judgment.”).

#### 4. Water Quality Standards

Pursuant to CWA section 303(d)(1), 33 U.S.C. § 1313(d)(1), each state is further required to identify those waters that do not meet water quality standards – called the “303(d)(1) list.” For impaired waters identified in the § 303(d)(1) list, the states must establish a total maximum daily load (“TMDL”) for pollutants identified by the EPA. A TMDL specifies the maximum amount of pollutant that can be discharged or loaded into the waters from all combined sources, so as to comply with the subject water quality standards.

CWA section 1323(a) requires federal agencies to comply with state and local water-quality requirements “in the same manner, and to the same extent as any nongovernmental entity.” Congress intended this section to ensure that federal agencies were required to “meet all [water pollution] control requirements as if they were private citizens.” S. REP. NO. 92-414 (1971), *as reprinted in* 1972 U.S.C.C.A.N. 3668, 3734. This provision applies to activities resulting in either “discharge or runoff of pollutants.” 33 U.S.C. § 1323(a).

Accordingly, any activity undertaken by BLM, BIA and SUIT in this area may degrade potential “outstanding waters.” Not only are BLM, BIA and SUIT mandated to follow antidegradation and water quality standards under the CWA and state law, but it must also take a NEPA “hard look” at any impacts that may be related to these water quality standards as well.

## 5. Water Quantity

In addition to impacts on water quality, oil and gas development processes, and particularly fracking, may result in significant impacts on water quantity. To frack a single well one time requires 2-8 million gallons.<sup>145</sup> Annually, the EPA estimates that 70-140 billion gallons of water are used to frack wells in the United States – enough to supply drinking water to 40-80 cities of 50,000.<sup>146</sup> This massive use of water is of particular concern in states in the interior west, like Colorado and New Mexico, where water supplies are scarce and already stretched.<sup>147</sup> Indeed, as the Department of Energy has recognized, “[a]vailable surface water supplies have not increased in 20 years, and groundwater tables and supplies are dropping at an alarming rate.”<sup>148</sup> Because of the chemicals that are added to fracking water, the water may not be reused.<sup>149</sup> Removing water for fracking can stress existing water supplies by lower water tables and dewatering aquifers, decreasing stream flows, and reducing water in surface reservoirs.<sup>150</sup> This can result in changes to water quality, and it can also alter the hydrology of water systems, and it can increase concentrations of pollutants in the water.

There is also potential for the reductions in water quantity to impacts aquatic and riverine species and habitat by affecting water flows and natural river processes: this, in turn, could lead to fish declines, changes to riparian plant communities, and alterations to sediment.<sup>151</sup> Further, because water resources in New Mexico are in many locations stressed or over-allocated, and oil and gas development has already lead to unpermitted and illegal water withdrawals.<sup>152</sup> The SEIS information to date is vague about where water for fracking will be acquired, stating that produced water from existing wells would be used supplemented by freshwater. Of note is the analysis done in the PEA for the North Carracas where the following section was included and raises numerous concerns over contamination and migration potential from CBM wells (chemicals and methane):

---

<sup>145</sup> J. David Hughes, *Will Natural Gas Fuel America in the 21st Century?*, May 2011, at 23.

<sup>146</sup> See EPA Draft Plan at 20.

<sup>147</sup> See WORC, *Gone for Good*, at 7-8 (noting water scarcity in west and significant water demands of fracking).

<sup>148</sup> U.S. Dep’t of Energy, *Energy Demands on Water Resources: Report to Congress on the Interdependency of Energy and Water*, Dec. 2012, at 12.

<sup>149</sup> See EPA Draft Plan at 20.

<sup>150</sup> *Id.*

<sup>151</sup> Nat’l Parks Conservation Ass’n, *National Parks and Hydraulic Fracturing: Balancing Energy Needs, Nature, and America’s National Heritage* (2013) at 23.

<sup>152</sup> See WORC, *Gone for Good* at 21.

1. *Groundwater contamination* – Methods used to enhance CBM production through increased permeability include acidizing, hydrofracturing, and cavitation. These processes are regulated by the BLM and COGCC to prevent groundwater contamination. Acidizing, the use of acids to dissolve minerals and increase permeability, is localized to the well bore within the producing unit, and therefore would not impact overall groundwater quality. Hydrofracturing uses a fluid mixture of water and gels to increase pressure within the formation thereby increasing permeability. This process only affects the targeted production horizon. Fluids are removed after use and disposed of in an injection well. Only the Fruitland Formation is affected by the hydrofracturing injection process; it does not constitute an impact to groundwater of adjacent units. Cavitation is an injection of air and/or produced water into the target horizon to increase pressures and fracturing. Because the only water used is derived from the Fruitland Formation and it is isolated to the target horizon, this process does not have an impact on other aquifers.

While increased formation permeability is important to well productivity, it increases the possibility of stimulating migration of gases and groundwater between geologic units.

Programmatic Environmental Assessment for 80-Acre Infill Oil and Gas Development on the Southern Ute Indian Reservation 4-51

Increased permeability could allow previously non-mobile gases and groundwater to move to existing conduits, such as old wells, which could contaminate other formations resulting in indirect and long-term impacts. By following the design features outlined in Section 2.4, impacts to ground water would be minimized.

Cathodic protection wells could impact groundwater through contamination. If COGCC construction regulations are adhered to, there should be no commingling of waters and no contamination of groundwater. Overall, the potential impact of contamination to groundwater from acidizing, hydrofracturing, cavitation, or cathodic protection wells would be indirect and long-term.

Groundwater aquifers that currently serve as a water supply source would not be impacted by produced water injection. Non-potable groundwater aquifers would not be negatively impacted. Most of the Fruitland Formation and all deeper geologic units receiving produced water from injection are not viable groundwater sources at distance from the outcrop because of their depth and poor water quality. There are no groundwater supply wells completed in the Fruitland Formation known to be used for domestic purposes in the study area.

*Shallow aquifer depletion* – Dewatering the Fruitland Formation would not have a measurable effect on the water levels or the viability of potable groundwater in overlying aquifers. The one exception could be near the Fruitland outcrop zone. Direct, but small to immeasurable long-term impacts would occur as water levels could decrease in seeps or springs fed by the Fruitland Formation near the outcrop (Cox et al. 2001, SSPA 2006b).



See Section 4.5.2 for a discussion of impacts to surface water from groundwater depletions.

*Methane contamination of shallow aquifers* – CBM production techniques for lowering the pressure and allowing for gas flow could include temporarily increasing the formation pressure during the hydrofracturing or cavitation process. These changes to Fruitland Formation pressures from CBM development could affect the migration of methane to overlying geologic formations and to surface seeps particularly if substantial fracturing occurred beyond areas of designed impact. The nearly impermeable Kirtland shale, which overlies the Fruitland Formation, typically prevents activity in the Fruitland Formation from impacting shallower Quaternary and Tertiary geologic formations. As production of groundwater reduces the pressure in the Fruitland Formation, the existing confining pressure levels would decrease and the tendency for upward migration of groundwater would be reduced.

Methane migration from the Fruitland Formation could impact overlying aquifers if new wells are not properly constructed or are constructed in the vicinity of old wells that were not properly constructed. These potential impacts would be indirect and long-term. By following the design features outlined in Section 2.4, impacts to groundwater would be minimized.

2. *Groundwater contamination* – Methods used to enhance CBM production through increased permeability include acidizing, hydrofracturing, and cavitation. These processes are regulated by the BLM and COGCC to prevent groundwater contamination. Acidizing, the use of acids to dissolve minerals and increase permeability, is localized to the well bore within the producing unit, and therefore would not impact overall groundwater quality. Hydrofracturing uses a fluid mixture of water and gels to increase pressure within the formation thereby increasing permeability. This process only affects the targeted production horizon. Fluids are removed after use and disposed of in an injection well. Only the Fruitland Formation is affected by the hydrofracturing injection process; it does not constitute an impact to groundwater of adjacent units. Cavitation is an injection of air and/or produced water into the target horizon to increase pressures and fracturing. Because the only water used is derived from the Fruitland Formation and it is isolated to the target horizon, this process does not have an impact on other aquifers.

While increased formation permeability is important to well productivity, it increases the possibility of stimulating migration of gases and groundwater between geologic units.

Increased permeability could allow previously non-mobile gases and groundwater to move to existing conduits, such as old wells, which could contaminate other formations resulting in indirect and long-term impacts. By following the design features outlined in Section 2.4, impacts to ground water would be minimized.

Cathodic protection wells could impact groundwater through contamination. If COGCC construction regulations are adhered to, there should be no commingling of waters and no contamination of groundwater. Overall, the potential impact of contamination to

groundwater from acidizing, hydrofracturing, cavitation, or cathodic protection wells would be indirect and long-term.

Groundwater aquifers that currently serve as a water supply source would not be impacted by produced water injection. Non-potable groundwater aquifers would not be negatively impacted. Most of the Fruitland Formation and all deeper geologic units receiving produced water from injection are not viable groundwater sources at distance from the outcrop because of their depth and poor water quality. There are no groundwater supply wells completed in the Fruitland Formation known to be used for domestic purposes in the study area.

*Shallow aquifer depletion* – Dewatering the Fruitland Formation would not have a measurable effect on the water levels or the viability of potable groundwater in overlying aquifers. The one exception could be near the Fruitland outcrop zone. Direct, but small to immeasurable long-term impacts would occur as water levels could decrease in seeps or springs fed by the Fruitland Formation near the outcrop (Cox et al. 2001, SSPA 2006b). See Section 4.5.2 for a discussion of impacts to surface water from groundwater depletions.

*Methane contamination of shallow aquifers* – CBM production techniques for lowering the pressure and allowing for gas flow could include temporarily increasing the formation pressure during the hydrofracturing or cavitation process. These changes to Fruitland Formation pressures from CBM development could affect the migration of methane to overlying geologic formations and to surface seeps particularly if substantial fracturing occurred beyond areas of designed impact. The nearly impermeable Kirtland shale, which overlies the Fruitland Formation, typically prevents activity in the Fruitland Formation from impacting shallower Quaternary and Tertiary geologic formations. As production of groundwater reduces the pressure in the Fruitland Formation, the existing confining pressure levels would decrease and the tendency for upward migration of groundwater would be reduced.

Methane migration from the Fruitland Formation could impact overlying aquifers if new wells are not properly constructed or are constructed in the vicinity of old wells that were not properly constructed. These potential impacts would be indirect and long-term. By following the design features outlined in Section 2.4, impacts to groundwater would be minimized.<sup>153</sup>

In addition, there are concerns that fracking activities fracture geological formations allowing VOC migration, as well as methane migration. This is particularly concerning in the SEIS project area where the Fruitland and Mancos Shale formations prominently outcrop.

In the SEIS, BLM, BIA and SUIT must closely assess the direct, indirect, and cumulative impacts of development on water supplies. 40 C.F.R. §§ 1508.7, 1508.8. This analysis must

---

<sup>153</sup> Programmatic Environmental Assessment (PEA) for 80-Acre Infill Oil and Gas Development on the Southern Ute Indian Reservation (USDI 2009), pages 4-51 to 4-52.

consider the potential sources of water in the TRFO planning area (Project area) that would be used for oil and gas development, and the impacts of these water withdrawals on water availability for drinking, agriculture, and wildlife. The analysis must further address the impacts to water quantity at different annual, seasonal, monthly, and daily time scales because the impacts of such water withdrawals could be more acute during times, months, and seasons of scarcity. For example, increased withdrawal and irretrievable contamination of waters will be particularly harmful during times – like the present – when much of the state is experiencing drought conditions.<sup>154</sup> The SEIS must disclose all sources of water withdrawn for use in fracking shale oil and gas wells proposed in the project area.

## **6. BLM, BIA and SUIT Must Take a Hard Look at Wastewater Disposal.**

BLM, BIA and SUIT must take a hard look at wastewater disposal in the SEIS, including a comparative analysis of the different alternatives for disposal. The agencies should analyze fully the wastewater disposal methods, without assuming that treatment can and will be adequate and take care of the problem. For example, *see* Brian D. Lutz, *et al.*, *Generation, Transport, and Disposal of Wastewater Associated with Marcellus Shale Gas Development*, WATER RESOURCES RESEARCH (February 8, 2013) (attached as Exhibit 157).

Contrary to current perceptions, Marcellus wells produce significantly less wastewater per unit gas recovered (approximately 35%) compared to conventional natural gas wells. Further, well operators classified only 32.3% of wastewater from Marcellus wells as flowback from hydraulic fracturing; most wastewater was classified as brine, generated over multiple years. *Despite producing less wastewater per unit of gas, developing the Marcellus shale has increased the total wastewater generated in the region by approximately 570% since 2004, overwhelming current wastewater disposal infrastructure capacity. Id.* at 1 (emphasis added).

## **7. BLM, BIA and SUIT Must Take a Hard Look at Radioactive materials**

The geological formations to be drilled to will undoubtedly result in radioactive waste, both Naturally Occurring Radioactive Materials (NORMS) and Technologically Enhanced Naturally Occurring Radioactive Materials (TENORMs). The radioactive materials will show up in formation drilling, production wastes, and operations. Every single Shale well that uses an on site pit for disposal of drill cuttings and/or fluids likely will leave behind some amount of concentrated radioactive materials. Alpha-emitting radioactive decay elements concentrates as pipe scale, so the waste is much more radioactive than any of the constituent parts.

In the SEIS:

---

<sup>154</sup> *See* WORC, *Gone for Good* at 8.

1. Please explicitly define what is proposed by BLM, BIA and SUIT for disposal of produced water, radioactive sludges/scales and production wastes, and contaminated equipment from shale drilling and operations.
2. Please include a description of BLM, BIA and SUIT responsibilities to evaluate radiation exposure risks and protect public health and safety.
3. Please include BLM, BIA and SUIT baseline groundwater analysis that will occur before shale development occurs so that agencies can insure that no environmental contamination occurs from disposal of radioactive sludge/scale.

The EPA has a backgrounder that can be utilized by in addressing the serious known problem of radioactivity associated with Oil and Gas Production wastes.<sup>155</sup>

### **III. The BLM, BIA and SUIT Must Analyze Infrastructure Impacted by the Proposed Action**

The proposed shale oil and gas development could have significant societal impacts to affected counties, communities, families, and individuals.

#### **A. The BLM, BIA and SUIT Must Consider Traffic Impacts that will Result from Increased Oil and Gas Development.**

The SEIS must include analysis of impacts from increases in vehicle traffic that authorized development would induce. For example, cases have required NEPA analyses of proposed casino projects to include impacts of increases in vehicle traffic the projects would induce. *See Michigan Gambling Opposition v. Kempthorne*, 525 F.3d 23, 29 (D.C. Cir. 2008); *Taxpayers of Michigan Against Casinos v. Norton*, 433 F.3d 852, 863 (D.C. Cir. 2006).

As noted above, fracking requires huge amounts of water, chemicals, sand and nitrogen, and consequently a great number of tanker truck trips to transport this water and chemicals to the site and to transport waste from the site. On the production side, trucks may be necessary to transport produced water and oil if infrastructure is not in place. Given that fracking can require *thousands* of round trips by heavy trucks when developing *each* well – the impacts of which are compounded exponentially for development of an entire oil and gas field – it is clear that this heavy industrial transport activity will result in dramatic impacts. Counties may be subject to tremendous adverse impacts to roads that they are expected to maintain.

This analysis must include the quantification of air quality impacts from increased truck traffic, estimate increased maintenance demands, consider safety costs for increased roadway use, increased traffic accidents and associated medical impacts and burdens on local hospitals, burdens on first responders and the criminal justice system, or to even project where or how many miles of access roads will be constructed.

---

<sup>155</sup> <http://www.epa.gov/radiation/tenorm/oilandgas.html>

A comprehensive 2013 study by Boulder County, Colorado of the impacts of fracking-related truck traffic (hereafter “Boulder Study”),<sup>156</sup> concluded that the hydraulic fracturing process for a single well would require an average of 1,400 one-way truck trips just to haul water to and from the site. Using national data, the study also finds that taking into account the full development process (construction, drilling, and completion), the average fracked well requires 2,206 one-way truck trips. *Id.* at 10. This figure does not include production phase trips, which could add an additional 730 truck trips per year depending on various factors including the success of the well and whether it is re-fracked. *Id.*

The Boulder Study serves as an example of what BLM, BIA and SUIT should analyze in its SEIS. The Study uses this trip generation data to analyze the impacts of oil and gas development on the county’s roadway system and, ultimately, to quantify these impacts in terms of maintenance and safety costs. *Id.* at 4. To establish a baseline, the Study inventoried current roadways including surface conditions, traffic volumes, and shoulder widths. In addition to the number of truck trips, the Study also examined the vehicle classification, load, origin, and destination of the trips. Finally, road deterioration and safety costs are calculated under three development scenarios, resulting in an average cost of \$36,800 per well over 16 years. *Id.* at 55. The Boulder Study is just one example of the type of quantitative analysis of oil and gas related traffic that can be completed with currently available information, and must be included in the SEIS.

#### **B. The BLM, BIA and SUIT Must Consider Impacts from Pipelines and Multi-Well Fluid Management Facilities.**

Related to the issue of transportation impacts from development of well-sites is the paradoxical relationship this has to pipelines for transporting fracking fluid, flowback, produced water, or condensates, in that as more pipelines are constructed, arguably less trucks would be required, and vice versa. Perhaps the most significant impacts associated with shale development will be management of fluids.

The SEIS must provide a clear assessment on what pipelines are actually to be required, what pipelines are “feasible,” whether they would be limited in what they transport, how many barrels per day they would transport, and how much truck traffic this would displace (if any, since the pipelines ultimately are transferring product to trucks). This should include estimates of how many pipelines will be constructed, how many miles of pipe will be laid (tentatively estimated at 600 miles), what their diameter would be, how many water-bodies they would cross, or where they will be located (it is implausible that the pipelines would be restricted to existing right-of-ways or along existing roads). Moreover, and as noted above in regard to road traffic, the SEIS must not use uncertainty as a shell-game to defer to future planning, and thus entirely

---

<sup>156</sup> See Colorado Public Radio, *Drilling for oil and gas drives Colo. trucking boom* (April 9, 2014) available at: <http://www.cpr.org/news/story/drilling-oil-and-gas-drives-trucking-boom> (referencing this study by Boulder County, Colorado: *boulder county oil and gas roadway impact study* (Jan 2013), available at: <https://www.bouldercounty.org/doc/landuse/dc120003oilgasroadwaystudy20130114.pdf> [hereinafter “Boulder Study”])

fail to provide sufficient analysis of pipeline impacts. This analysis is fundamental to satisfying the agency's hard look requirement.

However, reducing truck traffic through the installation of pipelines introduces different impacts to the environment that must be accounted for in the agency's analysis. For example, there is the potential risk of pipeline ruptures, but simply identifying that risk is insufficient. The agency must quantify and analyze this risk respective to the amount of pipeline projected in the planning area over the life of the SEIS. Further, there exists the potential for contamination of soils, surface water, and groundwater as a result of spills, and there must be analysis concerning the possible spill volumes or consideration of various spill scenarios given pipeline volume, emergency procedures, and mitigation requirements.

**C. The BLM, BIA and SUIT Must consider Geological conditions and retain records for well drilling/integrity and reclamation.**

Significant new oil and gas formations (Mancos Shale, Lewis Shale, Niobrara, Paradox) in the project area certainly requires a comprehensive understanding of geological and geochemistry conditions to be impacted by the Proposed Action, among past, present and future energy projects in the region. BLM Handbook H-1624-1 Planning for Fluid Mineral Resources provides concise guidance on the importance of integrating USGS resource estimates for Oil and Gas and the responsibility of the BLM appointed Fluid Minerals Specialist to consult with USGS (See Chapter III – Conducting and Documenting the Analysis of Factors, B) Procedural Guidance, Section C: U.S. Geological Survey Estimates of Oil and Gas Reserves, page III-3. Chapter III – Conducting and Documenting the Analysis of Factors, Section C: U.S. Geological Survey Estimates of Oil and Gas Reserves (3) Analyze Resource Capability and Potential, a) Oil and Gas Resources directs the Fluid Minerals Specialist, "...to independently estimate all other oil and gas resources in the planning unit and integrate them into the planning document." (page III-4).

**1. Geologic Suitability**

Operators of wells that will be hydraulically fractured must demonstrate to the satisfaction of the regulator that the wells will be sited in a location that is geologically suitable. In order to allow the regulator to determine suitability, the owner or operator must provide:

1. A detailed analysis of regional and local geologic stratigraphy and structure including, at a minimum, lithology, geologic facies, faults, fractures, stress regimes, seismicity, and rock mechanical properties;
2. A detailed analysis of regional and local hydrology including, at a minimum, hydrologic flow and transport data and modeling and aquifer hydrodynamics; properties of the producing and confining zone(s); groundwater levels for relevant formations; discharge points, including springs, seeps, streams, and wetlands; recharge rates and primary zones, and; water balance for the area including estimates of recharge, discharge, and pumping;
3. A detailed analysis of the cumulative impacts of hydraulic fracturing on the geology of producing and confining zone(s) over the life of the project. This must include, but is not

limited to, analyses of changes to conductivity, porosity, as well as permeability, geochemistry, rock mechanical properties, hydrologic flow, and fracture mechanics; and

4. A determination that the geology of the area can be described confidently and that the fate and transport of injected fluids and displaced formation fluids can be accurately predicted through the use of models.

Wells that will be hydraulically fractured must be sited such that a suitable confining zone is present. The operator must demonstrate to the satisfaction of the regulator that the confining zone:

1. Is of sufficient areal extent to prevent the movement of fluids to USDWs, based on the projected lateral extent of hydraulically induced fractures, injected hydraulic fracturing fluids, and displaced formation fluids over the life of the project;
2. Is sufficiently impermeable to prevent the vertical migration of injected hydraulic fracturing fluids or displaced formation fluids over the life of the project;
3. Is free of transmissive faults or fractures that could allow the movement of injected hydraulic fracturing fluids or displaced formation fluids to USDWs;
4. Contains at least one formation of sufficient thickness and with lithologic and stress characteristics capable of preventing or arresting vertical propagation of fractures; and
5. The regulator may require operators of wells that will be hydraulically fractured to identify and characterize additional zones that will impede or contain vertical fluid movement.

## **2. Area of Review**

Operators must delineate an “area of review,” which is the region around a well or group of wells that will be hydraulically fractured where USDWs may be endangered. It should be delineated based on 3D geologic and reservoir modeling that accounts for the physical and chemical extent of hydraulically induced fractures, injected hydraulic fracturing fluids and proppant, and displaced formation fluids and must be based on the life of the project. The physical extent would be defined by the modeled length and height of the fractures, horizontal and vertical penetration of hydraulic fracturing fluids and proppant, and horizontal and vertical extent of the displaced formation fluids. The chemical extent would be defined by that volume of rock in which chemical reactions between the formation, hydrocarbons, formation fluids, or injected fluids may occur, and should take into account potential migration of fluids over time. The model must take into account all relevant geologic and engineering information including but not limited to:

1. Rock mechanical properties, geochemistry of the producing and confining zone, and anticipated hydraulic fracturing pressures, rates, and volumes;
2. Geologic and engineering heterogeneities;
3. Potential for migration of injected and formation fluids through faults, fractures, and manmade penetrations; and
4. Cumulative impacts over the life of the project.

As actual data and measurements become available, the model must be updated and history matched. Operators must develop, submit, and implement a plan to delineate the area of

review. The plan should include the time frame under which the delineation will be reevaluated, including those operational or monitoring conditions that would trigger such a reevaluation. Within the area of review, operators must identify all wells that penetrate the producing and confining zones and provide:

1. A list of all such wells, including but not limited to wells permitted but not yet drilled, drilling, awaiting completion, active, inactive, shut-in, temporarily abandoned, plugged, and orphaned;
2. A description of each well's type, construction, date drilled, location, depth, record of plugging and/or completion, and any additional information the Division may require;
3. An assessment of the integrity of each well identified;
4. A plan for performing corrective action if any of the wells identified are improperly plugged, completed, or abandoned;
5. An assessment to determine the risk that the stimulation treatment will communicate with each well identified;
6. For each well identified as at-risk for communication, a plan for well control, including but not limited to:
  - a. A method to monitor for communication;
  - b. A determination of the maximum pressure which the at-risk well can withstand;
  - c. Actions to maintain well control;
  - d. If the at-risk well is not owned or operated by the owner/operator of the well to be stimulated, a plan for coordinating with the offset well operator to prevent loss of well control;
7. The location, orientation, and properties of known or suspected faults, fractures, and joint sets;
8. An evaluation of whether such features may act as migration pathways for injected fluids or displaced formation fluids to reach protected water or the surface;
9. An assessment to determine the risk that the stimulation treatment will communicate with such features; and
10. If such features may act as migration pathways and are at-risk for communication, the stimulation design must be revised to ensure that the treatment will not communicate with such features or the well must be re-sited. This information should be provided with the stimulation permit application.

Communication between offset wells during stimulation is a serious problem, risking blowouts in adjacent wells and/or aquifer contamination during well stimulation. A New Mexico oil well recently experienced a blowout, resulting in a spill of more than 8,400 gallons of fracturing fluid, oil, and water. The blowout occurred when a nearby well was being hydraulically fractured and the fracturing fluids intersected this offset well.<sup>157</sup> The incident led the New Mexico Oil Conservation Division to request information about other instances of communication between

---

<sup>157</sup> Tina Jensen, *Fracking fluid blows out nearby well; Cleanup costs, competing technologies at issue*, KASA.COM. (Oct. 18 2013).



wells during drilling, completion, stimulation or production operations.<sup>158</sup> Incidents of communication between wells during stimulation have been documented in British Columbia<sup>159</sup>, Pennsylvania,<sup>160</sup> Texas, New Mexico and other states across the country.<sup>161</sup>

The Alberta Energy Regulator (“AER”), the oil and gas regulator in Alberta, Canada, recognized that communication between wells during fracturing is a serious risk to well integrity and groundwater after a number of spills and blowouts resulted from communication between wells during fracturing. As a result, AER created requirements to address the risk of communication and reduce the likelihood of occurrence.<sup>162</sup> Similarly, Enform, a Canadian oil and gas industry safety association, published recommended practices to manage the risk of communication.<sup>163</sup> We recommend that the BLM review these rules and incorporate similar requirements.

### 3. Baseline Water Testing

Operators must submit to the regulator a statistically significant sample, as determined by the regulator, of existing and/or new geochemical analyses of each of the following, within the area of review:

1. Any and all sources of water that serve as underground sources of drinking water (“USDWs”) in order to characterize baseline water quality. This data must be made publically available through an online, geographically-based reporting system. The sampling methodology must be based on local and regional hydrologic characteristics

---

<sup>158</sup> State of New Mexico, Energy, Minerals and Natural Resources Department, *Aztec District III-Request for information*, n.p., (Oct. 22, 2013).

<sup>159</sup> “BC Oil and Gas Commission, *Safety Advisory 2010-03, May 20, 2010: Communication During Fracture Stimulation*, n.p. (May 20 2010).

<sup>160</sup> See, e.g. Scott Detrow, *Perilous Pathways: How Drilling Near An Abandoned Well Produced a Methane Geyser*, State Impact Pennsylvania, NPR (October 9, 2012); Pennsylvania Department of Environmental Protection, Bureau of Oil and Gas Management, *Draft Report - Stray Natural Gas Migration Associated with Oil and Gas Wells* (October 28, 2009).

<sup>161</sup> Gayathri Vaidyanathan, *When 2 wells meet, spills can often follow*, ENERGYWIRE (Aug. 5, 2013).

<sup>162</sup> Alberta Energy Board, *Directive 083: Hydraulic Fracturing – Subsurface Integrity* (May 2013) at 15, available at: <http://www.aer.ca/documents/directives/Directive083.pdf>.

<sup>163</sup> Enform Canada, *Interim IRP 24: Fracture Stimulation: Interwellbore Communication; An Industry Recommended Practice For The Canadian Oil And Gas Industry*, Interim Volume 24, 1st Edition (Mar. 27, 2013).

such as rates of precipitation and recharge and seasonal fluctuations. At a minimum, characterization must include:

- a. Standard water quality and geochemistry;<sup>164</sup>
- b. Stable isotopes;
- c. Dissolved gases;
- d. Hydrocarbon concentration and composition. If hydrocarbons are present in sufficient quantities for analysis, isotopic composition must be determined;
- e. Chemical compounds or constituents thereof, or reaction products that may be introduced by the drilling or hydraulic fracturing process. The use of appropriate marker chemicals is permissible provided that the operator can show scientific justification for the choice of marker(s);

Operators should also consider testing for environmental tracers to determine groundwater age;

2. Any hydrocarbons that may be encountered both vertically and really throughout the area of review;
3. The producing zone(s) and confining zone(s) and any other intervening zones as determined by the regulator. At a minimum, characterization must include:
  - a. Mineralogy;
  - b. Petrology; and
  - c. Major and trace element bulk geochemistry.

The site characterization and planning data listed above does not have to be submitted with each individual well application as long as such data is kept on file with the appropriate regulator and the well for which a permit is being sought falls within the designated area of review.

#### **4. Water Use and Disposal Planning**

Operators must submit to the regulator a plan for cumulative water use over the life of the project. The plan should take into account other activities that will draw water from the same sources, such as agricultural or industrial activities; designated best use; seasonal and longer timescale variations in water availability; and historical drought information. Elements of the plan must include but are not limited to:

1. The anticipated source, timing, and volume of withdrawals and intended use;

---

<sup>164</sup> Including: Turbidity, Specific Conductance, Total Solids, Total Dissolved Solids, pH, Dissolved Oxygen, Redox State, Alkalinity, Calcium, Magnesium, Sodium, Potassium, Sulfate, Chloride, Fluoride, Bromide, Silica, Nitrite, Nitrate + Nitrite, Ammonia, Phosphorous, Total Organic Carbon, Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Bromide, Cadmium, Chromium, Cobalt, Copper, Cyanide, Iron, Lead, Manganese, Mercury, Molybdenum, Nickel, Selenium, Silver, Strontium, Thallium, Thorium, Uranium, Vanadium, Zinc, Cryptosporidium, Giardia, Plate Count, Legionella, Total Coliforms, and Organic Chemicals including Volatile Organic Compounds (VOCs).

2. Anticipated transport distances and methods (e.g. pipeline, truck) and methods to minimize related impacts including, but not limited to: land disturbance, traffic, vehicle accidents, and air pollution;
3. Anticipated on-site storage methods;
4. A description of methods the operator will use to maximize the use of non-potable water sources including reuse and recycling of wastewater;
5. An evaluation of potential adverse impacts to aquatic species and habitat, wetlands, and aquifers, including the potential for the introduction of invasive species, and methods to minimize those impacts; and
6. Anticipated chemical additives and chemical composition of produced water, with particular attention to those chemicals that would hinder the reuse or recycling of wastewater or pose a challenge to wastewater treatment.

Operators must submit to the regulator a proposed plan for handling wastewater, such as flowback and produced fluids. Elements of the plan must include, but are not limited to:

1. Anticipated cumulative volumes of wastewater over the life of the project, reported in three categories: reuse, recycle, and disposal;
2. Anticipated on-site temporary storage methods;
3. Anticipated transport distances and methods (e.g. pipeline, truck) and methods to minimize related impacts including, but not limited to: land disturbance, traffic, vehicle accidents, and air pollution; and
4. An assessment of currently available and anticipated disposal methods, *e.g.* disposal wells, wastewater treatment facilities, etc. This assessment must enumerate the disposal options available and evaluate the ability of those options to handle projected wastewater volumes. In the case of wastewater treatment facilities, the assessment must also evaluate the ability of those facilities to successfully treat the wastewater such that it would not pose a threat to water supplies into which it is discharged.

## **5. Well Design and Construction**

Proper well construction is crucial to ensuring protection of USDWs. The first step to ensuring good well construction is ensuring proper well drilling techniques are used. This includes appropriate drilling fluid selection, to ensure that the wellbore will be properly conditioned and to minimize borehole breakouts and rugosity that may complicate casing and cementing operations. Geologic, engineering, and drilling data can provide indications of potential complications to achieving good well construction, such as highly porous or fractured intervals, lost circulation events, abnormally pressured zones, or drilling “kicks” or “shows.” These must be accounted for in designing and implementing the casing and cementing program. Reviewing data from offset wellbores can be helpful in anticipating and mitigating potential drilling and construction problems. Additionally, proper wellbore cleaning and conditioning techniques must be used to remove drilling mud and ensure good cement placement. Hydraulic fracturing requires fluid to be injected into the well at high pressure and, therefore, wells must be appropriately designed and constructed to withstand this pressure. The casing and cementing program must:

- Properly control formation pressures and fluids;

- Prevent the direct or indirect release of fluids from any stratum to the surface;
- Prevent communication between separate hydrocarbon-bearing strata;
- Protect freshwater aquifers/useable water from contamination;
- Support unconsolidated sediments;
- Protect and/or isolate lost circulation zones, abnormally pressured zones, and any prospectively valuable mineral deposits.

Casing must be designed to withstand the anticipated stresses imposed by tensile, compressive, and buckling loads; burst and collapse pressures; thermal effects; corrosion; erosion; and hydraulic fracturing pressure. The casing design must include safety measures that ensure well control during drilling and completion and safe operations during the life of the well. The components of a well that ensure the protection and isolation of USDWs are steel casing and cement. Multiple strings of casing are used in the construction of oil and gas wells, including: conductor casing, surface casing, production casing, and potentially intermediate casing. For all casing strings, the design and construction should be based on Good Engineering Practices (“GEP”), Best Available Technology (“BAT”), and local and regional engineering and geologic data. All well construction materials must be compatible with fluids with which they may come into contact and be resistant to corrosion, erosion, swelling, or degradation that may result from such contact.

## **6. Conductor Casing**

Depending on local conditions, conductor casing can either be driven into the ground, or a hole drilled and the casing lowered into the hole. In the case where a hole is excavated, the space between the casing and the wellbore – the annulus – should be cemented to surface. A cement pad should also be constructed around the conductor casing to prevent the downward migration of fluids and contaminants.

## **7. Surface Casing**

Surface casing setting depth must be based on relevant engineering and geologic factors, but be shallower than any hydrocarbon-bearing zones, and at least 100 feet but not more than 200 feet below the deepest protected water. If shallow hydrocarbon-bearing zones are encountered when drilling the surface casing portion of the hole, operators must notify regulators and take appropriate steps to ensure protection of protected water.

Surface casing must be fully cemented to surface by the pump and plug method. If cement returns are not observed at the surface, remedial cementing must be performed to cement the casing from the top of cement to the ground surface.

## **8. Intermediate Casing**

Depending on local geologic and engineering factors, one or more strings of intermediate casing may be required. This will depend on factors including, but not limited to: the depth of the well, the presence of hydrocarbon-or fluid-bearing formations, abnormally pressured zones, lost circulation zones, or other drilling hazards. Casing setting depth must be based on local

engineering and geologic factors and be set at least 100 feet below the deepest protected water, anomalous pressure zones, lost circulation zones, and other drilling hazards. Intermediate casing must be set to protect groundwater if surface casing was set above the base of protected water, and/or if additional protected water was found below the surface casing shoe.

When intermediate casing is installed to protect groundwater, the operator shall set a full string of new intermediate casing to a minimum depth of at least 100 feet below the base of the deepest strata containing protected water and cement to the surface. The location and depths of any hydrocarbon strata or protected water strata that is open to the wellbore above the casing shoe must be confirmed by coring, electric logs, or testing, and shall be reported as part of the completion report.

When intermediate casing is set for a reason other than to protect strata that contain protected water, it must be fully cemented to surface unless doing so would result in lost circulation. Where this is not possible or practical, the cement must extend from the casing shoe to 600 feet above the top of the shallowest zone to be isolated (*e.g.* productive zone, abnormally pressured zone, etc). Where the distance between the casing shoe and shallowest zone to be isolated makes this technically infeasible, multi-stage cementing must be used to isolate any hydrocarbon or fluid-bearing formations or abnormally pressured zones and prevent the movement of fluids. An excess of 25% cement should be mixed unless a caliper log is run to more accurately determine necessary cement volume.

## **9. Production Casing**

If both surface casing and intermediate casing are used as water protection casing, or if intermediate casing is not used, a full string of production casing is required. A production liner may be hung from the base of the intermediate casing and used as production casing as long as the surface casing is used as the water protecting casing, and intermediate casing is set for a reason other than isolation of protected water. When the production string does not extend to the surface, at least 200 feet of overlap between the production string and next larger casing string should be required. This overlap should be cemented and tested by a fluid-entry test at a pressure that is at least 500 psi higher than the maximum anticipated pressure to be encountered by the wellbore during completion and production operations to determine whether there is a competent seal between the two casing strings.

When intermediate casing is not used, production casing must be fully cemented to surface unless doing so would result in lost circulation. If not cemented to the surface, production casing shall be cemented with sufficient cement to fill the annular space from the casing shoe to at least 600 feet above fluid-bearing formations, lost circulation zones, oil and gas zones, anomalous pressure intervals, or other drilling hazards. Where the distance between the casing shoe and shallowest zone to be isolated makes this technically infeasible, multi-stage cementing must be used to isolate any hydrocarbon or fluid-bearing formations or abnormally pressured zones and prevent the movement of fluids. Sufficient cement shall also be used to fill the annular space to at least 100 feet above the base of the freshwater zone, either by lifting cement around the casing shoe or cementing through perforations or a cementing device placed at or below the base of the freshwater zone.

## 10. General

For surface, intermediate, and production casing, at a minimum, centralizers are required at the top, shoe, above and below a stage collar or diverting tool (if used), and through all protected water zones. In non-deviated holes, a centralizer shall be placed every fourth joint from the cement shoe to the ground surface or to within one joint of casing from the bottom of the cellar, or casing shall be centralized by implementing an alternative centralization plan approved by the BLM. In deviated holes, the BLM may require the operator to provide additional centralization. All centralizers must meet API Spec 10D (Recommended Practice for Casing Centralizers – for bow string centralizers), or API Spec 10 TR4 (rigid and solid centralizers) and 10D-2 (Petroleum and Natural Gas Industries, Equipment for Well Cementing, Part 2, Centralizer Placement and Stop Collar Testing).

All cemented casing strings must have a uniformly concentric cement sheath of at least 1" (*i.e.* minimum difference of 2" between wellbore diameter and casing outside diameter). An excess of 25% cement should be mixed unless a caliper log is run to more accurately determine necessary cement volume.

For any section of the well drilled through fresh water-bearing formations, drilling fluids must be limited to air, fresh water, or fresh water based mud, and exclude the use of synthetic or oil-based mud or other chemicals.

In areas where the depth to the lowest protected water is not known, operators must estimate this depth and provide the estimate with the application for a permit to drill. This depth should then be verified by running petrophysical logs, such as resistivity logs, after drilling to the estimated depth. If the depth to the deepest protected water is deeper than estimated, an additional string of casing is required. Surface casing must be of sufficient diameter to allow the use of one or more strings of intermediate casing. All instances of protected water not anticipated on the permit application must be reported, including the formation depth and thickness and water flow rate, if known or estimated.

All cement must have a 72-hour compressive strength of at least 1200 psi and free water separation of no more than two milliliters per 250 milliliters of cement, tested in accordance with the current API RP 10B. Cement must conform to API Specification 10A and gas-blocking additives must be used. Cement mix water chemistry must be proper for the cement slurry designs. At a minimum, the water chemistry of the mix water must be tested for pH prior to use, and the cement must be mixed to manufacturer's recommendations. An operator's representative must be on site verifying that the cement mixing, testing, and quality control procedures used for the entire duration of the cement mixing and placement are consistent with the approved engineered design and meet the cement manufacturer recommendations, API standards, and the requirements of this section.

Compressive strength tests of cement mixtures without published performance data must be performed in accordance with the current API RP 10B and the results of these tests must be provided to the regulator prior to the cementing operation. The test temperature must be within

10 degrees Fahrenheit of the formation equilibrium temperature at the top of cement. A better quality of cement may be required where local conditions make it necessary to prevent pollution or provide safer operating conditions.

Prior to cementing, the hole must be prepared to ensure an adequate cement bond by circulating at least two hole volumes of drilling fluid and ensuring that the well is static and all gas flows are killed. Top and bottom wiper plugs and spacer fluids must be used to separate drilling fluid from cement and prevent cement contamination. Casing must be rotated and reciprocated during cementing when possible and when doing so would not present a safety risk. Cement should be pumped at a rate and in a flow regime that inhibits channeling of the cement in the annulus. During placement of the cement, operator shall monitor pump rates to verify they are within design parameters to ensure proper displacement efficiency. Throughout the cementing process operator shall monitor cement mixing in accordance with cement design and cement densities during the mixing and pumping.

All surface, intermediate, and production casing strings must stand under pressure until a compressive strength of 500 psi is reached before drilling out, initiating testing, or disturbing the cement in any way. In no case should the wait-on-cement (“WOC”) time be less than 8-hours. All surface, intermediate, and production casing strings must be pressure tested. Drilling may not be resumed until a satisfactory pressure test is obtained. Casing must be pressure tested to a minimum of 0.5 psi/foot of casing string length or 1500 psi, whichever is greater, but not to exceed 80% of the minimum internal yield. If the pressure declines more than 10% in a 30-minute test or if there are other indications of a leak, corrective action must be taken.

A formation integrity test (“FIT”) must be performed immediately after drilling out of all surface and intermediate casing. The test should demonstrate that the casing shoe will maintain integrity at the anticipated pressure to which it will be subjected while drilling the next section of the well, no flow path exists to formations above the casing shoe, and that the casing shoe is competent to handle an influx of formation fluid or gas without breaking down. If any FIT fails, the operator must contact the BLM and remedial action must be taken to ensure that no migrations pathways exist. The casing and cementing plan may need to be revised to include additional casing strings in order to properly manage pressure.

Cement integrity and location must be verified using cement evaluation tools that can detect channeling in 360 degrees. If fluid returns, lift pressure, displacement and/or other operations indicate inadequate cement coverage, the operator must: (i) run a radial cement evaluation tool, a temperature survey, or other test approved by the Division to identify the top of cement; (ii) submit a plan for remedial cementing to the Division for approval; and (iii) implement such plan by performing additional cementing operations to remedy such inadequate coverage prior to continuing drilling operations. Cement evaluation logging must be performed on all strings of cemented casing that isolate protected water, potential flow zones, or through which stimulation will be performed.

When well construction is completed, the operator should certify, in writing, that the casing and cementing requirements were met for each casing string.

## 11. Well Logs

After drilling the well but prior to casing and cementing operations, operators must obtain well logs to aid in the geologic, hydrologic, and engineer characterization of the subsurface. Open hole logs, *i.e.* logs run prior to installing casing and cement, should at a minimum include:

### Gamma Ray Logs:

Gamma ray logs detect naturally occurring radiation. These logs are commonly used to determine generic lithology and to correlate subsurface formations. Shale formations have higher proportions of naturally radioactive isotopes than sandstone and carbonate formations. Thus, these formations can be distinguished in the subsurface using gamma ray logs.

### Density/Porosity Logs:

Two types of density logs are commonly used: bulk density logs, which are in turn used to calculate density porosity, and neutron porosity logs. While not a direct measure of porosity, these logs can be used to calculate porosity when the formation lithology is known. These logs can be used to determine whether the pore space in the rock is filled with gas or with water.

### Resistivity Logs:

These logs are used to measure the electric resistivity, or conversely conductivity, of the formation. Hydrocarbon and fresh water-bearing formations are resistive, *i.e.* they cannot carry an electric current. Brine-bearing formations have a low resistivity, *i.e.* they can carry an electric current. Resistivity logs can therefore be used to help distinguish brine-bearing from hydrocarbon-bearing formations. In combination with Darcy's Law, resistivity logs can be used to calculate water saturation.

### Caliper Logs:

Caliper logs are used to determine the diameter and shape of the wellbore. These are crucial in determining the volume of cement that must be used to ensure proper cement placement.

These four logs, run in combination, make up one of the most commonly used logging suites. Additional logs may be desirable to further characterize the formation, including but not limited to Photoelectric Effect, Sonic, Temperature, Spontaneous Potential, Formation Micro-Imaging ("FMI"), Borehole Seismic, and Nuclear Magnetic Resonance ("NMR"). The use of these and other logs should be tailored to site-specific needs.

## 12. Core and Fluid Sampling

Operators of wells that will be hydraulically fractured should also obtain whole or sidewall cores of the producing and confining zone(s) and formation fluid samples from the producing zone(s). At a minimum, routine core analysis should be performed on core samples representative of the range of lithology and facies present in the producing and confining zone(s). Special Core Analysis ("SCAL") should also be considered, particularly for samples of the confining zone, where detailed knowledge of rock mechanical properties is necessary to



determine whether the confining zone can prevent or arrest the propagation of fractures. Operators should also record the fluid temperature, pH, conductivity, reservoir pressure and static fluid level of the producing and confining zone(s). Operators should prepare and submit a detailed report on the physical and chemical characteristics of the producing and confining zone(s) and formation fluids that integrates data obtained from well logs, cores, and fluid samples. This must include the fracture pressure of both the producing and confining zone(s). This data does not need to be gathered for every well but operators should obtain a statistically significant number of samples.

### **13. Mechanical Integrity**

Operators must maintain mechanical integrity of wells at all times. Mechanical integrity should be periodically tested by means of a pressure test with liquid or gas, a tracer survey such as oxygen activation logging or radioactive tracers, a temperature or noise log, and a casing inspection log. The frequency of such testing should be based on-site, with operation specific requirements and be delineated in a testing and monitoring plan prepared, submitted, and implemented by the operator.

Mechanical integrity and annular pressure should be monitored over the life of the well. Instances of sustained casing pressure can indicate potential mechanical integrity issues. The annulus between the production casing and tubing (if used) should be continually monitored. Continuous monitoring allows problems to be identified quickly so repairs may be made in a timely manner, reducing the risk that a wellbore problem will result in contamination of USDWs.

### **14. Operations and Monitoring**

Each hydraulic fracturing treatment must be modeled using a 3D geologic and reservoir model, as described in the Area of Review requirements, prior to operation to ensure that the treatment will not endanger USDWs. Prior to performing a hydraulic fracturing treatment, operators should perform a pressure fall-off or pump test, injectivity tests, and/or a mini-frac. Data obtained from such tests can be used to refine the hydraulic fracture model, design, and implementation.

Prior to well stimulation, all casing and tubing to be used by the operator to perform the stimulation treatment must be pressure tested. For cemented completions, the test pressure must be at least 500 psi greater than the anticipated maximum surface pressure to be experienced during the stimulation operation or the life of the completion operation. For non-cemented completions, the test pressure must be a minimum of: (i) 70% of the lowest activating pressure for pressure actuated sleeve completions; or (ii) 70% of formation integrity for open-hole completions, as determined by a formation integrity test. A failed test is one in which the pressure declines more than 10% in a 30-minute test or if there are other indications of a leak.

In the event of a failed test, the operator must:

1. Orally notify the authorized officer as soon as practicable but no later than 24 hours following the failed test, and;

2. Perform remedial work to restore mechanical integrity.

Stimulation operations may not begin until a successful mechanical integrity test is performed and the results are submitted to the regulator. If mechanical integrity cannot be restored, the well must be plugged and abandoned.

During the well stimulation operation, the operator must continuously monitor and record the pressures in each well annuli, surface injection pressure, slurry rate, proppant concentration, fluid rate, and the identities, rates, and concentrations of all additives (including proppant).

If during any stimulation operation the annulus pressure:

1. increases by more than 500 pounds per square inch as compared to the pressure immediately preceding the stimulation; or
2. exceeds 80% of the API rated minimum internal yield on any casing string in communication with the stimulation treatment;

the operation must immediately cease, and the operator must take immediate corrective action and orally notify the authorized officer immediately following the incident. Within one week after the stimulation operations are completed, the operator must submit a report containing all details pertaining to the incident, including corrective actions taken.

If at any point during the hydraulic fracturing operation the monitored parameters indicate a loss of mechanical integrity or if injection pressure exceeds the fracture pressure of the confining zone(s), the operation must immediately cease. If either occurs, the operator must notify the regulator within 24 hours and must take all necessary steps to determine the presence or absence of a leak or migration pathways to USDWs. Prior to any further operations, mechanical integrity must be restored and demonstrated to the satisfaction of the regulator and the operator must demonstrate that the ability of the confining zone(s) to prevent the movement of fluids to USDWs has not been compromised. If a loss of mechanical integrity is discovered or if the integrity of the confining zone has been compromised, operators must take all necessary steps to evaluate whether injected fluids or formation fluids may have contaminated or have the potential to contaminate any unauthorized zones. If such an assessment indicates that fluids may have been released into a USDW or any unauthorized zone, operators must notify the regulator within 24 hours, take all necessary steps to characterize the nature and extent of the release, and comply with and implement a remediation plan approved by the regulator. If such contamination occurs in a USDW that serves as a water supply, a notification must be placed in a newspaper available to the potentially affected population and on a publically accessible website and all known users of the water supply must be individually notified immediately by mail and by phone.

The use of diesel fuel and related products, BTEX compounds, and 2-BE in well stimulation fluids should be prohibited.

Techniques to measure actual fracture growth should be used, including downhole tiltmeters and microseismic monitoring. These techniques can provide both real-time data and, after data processing and interpretation, can be used in post-fracture analysis to inform fracture

models and refine hydraulic fracture design. Tiltmeters measure small changes in inclination and provide a measure of rock deformation. Microseismic monitoring uses highly sensitive seismic receivers to measure the very low energy seismic activity generated by hydraulic fracturing.

Hydraulic fracturing fluid and proppant can sometimes be preferentially taken up by certain intervals or perforations. Tracer surveys and temperature logs can be used to help determine which intervals were treated. Tracers can be either chemical or radioactive and are injected during the hydraulic fracturing operation. After hydraulic fracturing is completed, tools are inserted into the well that can detect the tracer(s). Temperature logs record the differences in temperature between zones that received fracturing fluid, which is injected at ambient surface air temperature, and in-situ formation temperatures, which can be in the hundreds of degrees Fahrenheit.

Operators should develop, submit, and implement a long-term groundwater quality monitoring program. Dedicated water quality monitoring wells should be used to help detect the presence of contaminants prior to their reaching domestic water wells. Placement of such wells should be based on detailed hydrologic flow models and the distribution and number of hydrocarbon wells. Baseline monitoring should begin at least a full year prior to any activity, with monthly or quarterly sampling to characterize seasonal variations in water chemistry. Monitoring should continue a minimum of 5 years prior to plugging and abandonment.

## **15. Reporting**

At a minimum, operators must report:

- All instances of hydraulic fracturing injection pressure exceeding operating parameters as specified in the permit;
- All instances of an indication of loss of mechanical integrity;
- Any failure to maintain mechanical integrity;
- The results of:
  - Continuous monitoring during hydraulic fracturing operations;
  - Techniques used to measure actual fracture growth; and
  - Any mechanical integrity tests;
- The detection of the presence of contaminants pursuant to the groundwater quality monitoring program;
- Indications that injected fluids or displaced formation fluids may pose a danger to USDWs;
- All spills and leaks; and
- Any non-compliance with a permit condition.

The following must be made publically available on a well-by-well basis through an online, geographically based reporting system, a minimum of 30 days prior to a hydraulic fracturing operation:

1. Baseline water quality analyses for all USDWs within the area of review;
2. Proposed source, volume, geochemistry, and timing of withdrawal of all base fluids; and

3. Proposed chemical additives (including proppant coating), reported by their type, chemical compound or constituents, and Chemical Abstracts Service (“CAS”) number, and the proposed concentration or rate and volume percentage of all additives.

The following must be made publically available on a well-by-well basis through an online, geographically based reporting system, a maximum of 30 days subsequent to a hydraulic fracturing operation:

1. Actual source, volume, geochemistry and timing of withdrawal of all base fluids;
2. Actual chemical additives used, reported by their type, chemical compound or constituents, CAS number, and the actual concentration or rate and volume percentage of all additives; and
3. Geochemical analysis of flowback and produced water, with samples taken at appropriate intervals to determine changes in chemical composition with time and sampled until such time as chemical composition stabilizes.

## **16. Emergency and Remedial Response**

Operators must develop, submit, and implement an emergency response and remedial action plan. The plan must describe the actions the operator will take in response to any emergency that may endanger human life or the environment – including USDWs – such as blowouts, fires, explosions, or leaks and spills of toxic or hazardous chemicals. The plan must include an evaluation of the ability of local resources to respond to such emergencies and, if found insufficient, how emergency response personnel and equipment will be supplemented. Operators should detail what steps they will take to respond to cases of suspected or known water contamination, including notification of users of the water source. The plan must describe what actions will be taken to replace the water supplies of affected individuals in the case of the contamination of a USDW.

## **17. Plugging and Abandonment**

Prior to plugging and abandoning a well, operators should determine bottom hole pressure and perform a mechanical integrity test to verify that no remedial action is required. Operators should develop and implement a well plugging plan. The plugging plan should be submitted with the permit application and should include the methods that will be used to: determine bottom hole pressure and mechanical integrity; the number and type of plugs that will be used; plug setting depths; the type, grade, and quantity of plugging material that will be used; the method for setting the plugs; and, a complete wellbore diagram showing all casing setting depths and the location of cement and any perforations.

Plugging procedures must ensure that hydrocarbons and fluids will not migrate between zones, into USDWs, or to the surface. A cement plug should be placed at the surface casing shoe and extend at least 100 feet above and below the shoe. All hydrocarbon-bearing zones should be permanently sealed with a plug that extends at least 100 feet above and below the top and base of all hydrocarbon-bearing zones. Plugging of a well must include effective segregation of uncased and cased portions of the wellbore to prevent vertical movement of fluid within the wellbore. A continuous cement plug must be placed from at least 100 feet below to 100 feet above the casing

shoe. In the case of an open hole completion, any hydrocarbon or fluid-bearing zones shall be isolated by cement plugs set at the top and bottom of such formations, and that extend at least 100 feet above the top and 100 feet below the bottom of the formation.

At least 60-days prior to plugging, operators must submit a notice of intent to plug and abandon. If any changes have been made to the previously approved plugging plan the operator must also submit a revised plugging plan. No later than 60-days after a plugging operation has been completed, operators must submit a plugging report, certified by the operator and person who performed the plugging operation.

After plugging and abandonment, operators must continue to conduct monitoring and provide financial assurance for an adequate time period, as determined by the regulator, that takes into account site-specific characteristics including but not limited to:

- The results of hydrologic and reservoir modeling that assess the potential for movement of contaminants into USDWs over long time scales; and
- Models and data that assess the potential degradation of well components (*e.g.* casing, cement) over time and implications for mechanical integrity and risks to USDWs.

## **VI. The BLM Must Sufficiently Analyze All Reasonable Alternatives.**

Through the SEIS process, the BLM, BIA and SUIT are required to “estimate and display the physical, biological, economic, and social effects of implementing each alternative considered in detail. The estimation of effects shall be guided by the planning criteria and procedures implementing [NEPA].” 43 C.F.R. § 1610.4-6. Incumbent to any NEPA process is a robust analysis of alternatives to the proposed action. Consideration of reasonable alternatives is necessary to ensure that the agency has before it and takes into account all possible approaches to, and potential environmental impacts of, a particular project. NEPA’s alternatives requirement, therefore, ensures that the “most intelligent, optimally beneficial decision will ultimately be made.” *Calvert Cliffs’ Coordinating Comm., Inc. v. U.S. Atomic Energy Comm’n*, 449 F.2d 1109, 1114 (D.C. Cir. 1971).

“[T]he heart” of an environmental analysis under NEPA is the analysis of alternatives to the proposed project, and agencies must evaluate all reasonable alternatives to a proposed action.” *Colorado Environmental Coalition*, 185 F.3d at 1174 (quoting 40 C.F.R. § 1502.14). An agency must gather “information sufficient to permit a reasoned choice of alternatives as far as environmental aspects are concerned.” *Greater Yellowstone*, 359 F.3d at 1277 (citing *Colorado Environmental Coalition*, 185 F.3d at 1174); *see also Holy Cross Wilderness Fund v. Madigan*, 960 F.2d 1515, 1528 (10<sup>th</sup> Cir. 1992). Thus, agencies must “ensure that the statement contains sufficient discussion of the relevant issues and opposing viewpoints to enable the decisionmaker to take a ‘hard look’ at environmental factors, and to make a reasoned decision.” *Izaak Walton League of America v. Marsh*, 655 F.2d 346, 371 (D.C. Cir.1981) (citing *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n. 21 (1976)).

Of critical importance is that the agencies consider alternatives that properly balances the permanent protection of certain critical areas from the pressures of oil and gas development by industry proponents. In addition, it is important to identify if the 1,534 proposed wells and ancillary facilities are restricted to where SUIT either has surface or mineral ownership.

## **VII. FLPMA: Unnecessary and Undue Degradation**

The BLM is uniquely empowered to make this determination and, as codified in BLM's organic act, the Federal Land and Policy Management Act ("FLPMA") of 1976, 43 U.S.C. § 1701 *et. seq.*, taking such action is part of its mandate. FLPMA's congressional declaration states:

It is the policy of the United States that ... the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use;

43 U.S.C. § 1701(a)(8) (emphasis added).

Indeed, BLM is duty bound to develop and revise land use plans according to this congressional mandate, so as to "observe the principles of multiple use." 43 U.S.C. § 1712(c)(1). "Multiple use" means "a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values." *Id.* at § 1702(c).

The SEIS as it pertains to FLPMA, requires BLM to engage in the type of planning that is intended to give context to the agency's multiple use mandate. Accordingly, FLPMA provides specific criteria for land use plan revisions, requiring consideration of things such as: observation of the principles of multiple use and sustained yield; integrated consideration of physical, biological, economic, and other sciences; reliance on public lands resources and other values; consideration of present and future uses of the public lands; consideration of the relative scarcity of resource values; and weighing the long-term benefits to the public against the short-term benefits. *See* 43 U.S.C. § 1712(c)(1)-(9). Consideration of these criteria must drive the agency's NEPA analysis.

FLPMA does not mandate that every use be accommodated on every piece of land; rather, delicate balancing is required. *See Norton v. S. Utah Wilderness Alliance*, 542 U.S. 55, 58 (2004). "Multiple use" requires management of the public lands and their numerous natural resources so that they can be used for economic, recreational, and scientific purposes without the infliction of permanent damage." *Public Lands Council v. Babbitt*, 167 F.3d 1287, 1290 (10<sup>th</sup> Cir. 1999) (citing 43 U.S.C. § 1702 (c)). As held by the Tenth Circuit, "[i]f all the competing demands reflected in FLPMA were focused on one particular piece of public land, in many

instances only one set of demands could be satisfied. A parcel of land cannot both be preserved in its natural character and mined.” *Rocky Mtn. Oil & Gas Ass'n v. Watt*, 696 F.2d 734, 738 n. 4 (10th Cir.1982) (quoting *Utah v. Andrus*, 486 F.Supp. 995, 1003 (D.Utah 1979)); *see also* 43 U.S.C. § 1701(a)(8) (stating, as a goal of FLPMA, the necessity to “preserve and protect certain public lands in their natural condition”); *Pub. Lands Council*, 167 F.3d at 1299 (citing § 1701(a)(8)). As further provided by the Tenth Circuit:

BLM’s obligation to manage for multiple use does not mean that development *must* be allowed on [a particular piece of public lands]. Development is a *possible* use, which BLM must weigh against other possible uses – including conservation to protect environmental values, which are best assessed through the NEPA process. Thus, an alternative that closes the [proposed public lands] to development does not necessarily violate the principle of multiple use, and the multiple use provision of FLPMA is not a sufficient reason to exclude more protective alternatives from consideration. *New Mexico ex rel. Richardson*, 565 F.3d at 710.

This type of analysis has been absent from the BLM’s analysis of oil and gas development, which failed to consider, on equal footing, the value of permanent protection and preservation of public lands, along with industry pressure to lease and develop these lands for oil and gas resources. Given current industry pressure to open critical public lands to oil and gas development, it may be appropriate to revisit this decisionmaking in light of the new information and circumstances that BLM is now aware of. *See* 40 C.F.R. § 1502.9 (c).

While certain lands may indeed be appropriate for responsible fossil fuel resource development, it is equally evident that there are lands where other resource values should prevail. FLPMA affords BLM great authority to appropriately balance these competing interests, which expressly includes the responsibility to “preserve and protect certain public lands in their natural condition.” 43 U.S.C. § 1701(a)(8). Moreover, FLPMA further delegates BLM authority to permanently withdraw lands from consideration. *See* 43 U.S.C. § 1714. This ability authorizes the Secretary to “make, modify, extend, or revoke withdrawals.” *Id.* In either event, the TRFO cannot management public lands in a manner that prioritizes oil and gas development above the other resource values at stake.

“Application of this standard is necessarily context-specific; the words ‘unnecessary’ and ‘undue’ are modifiers requiring nouns to give them meaning, and by the plain terms of the statute, that noun in each case must be whatever actions are causing ‘degradation.’ ” *Theodore Roosevelt Conservation Partnership v. Salazar*, 661 F.3d 66, 76 (D.C. Cir. 2011) (citing *Utah v. Andrus*, 486 F.Supp. 995, 1005 n. 13 (D. Utah 1979) (defining “unnecessary” in the mining context as “that which is not necessary for mining” – or, in this context, “for oil and gas development” – and “undue” as “that which is excessive, improper, immoderate or unwarranted.”)); *see also Colorado Env't Coalition*, 165 IBLA 221, 229 (2005) (concluding that in the oil and gas context, a finding of “unnecessary or undue degradation” requires a showing “that a lessee’s operations are or were conducted in a manner that does not comply with applicable law or regulations, prudent management and practice, or reasonably available technology, such that the lessee could not undertake the action pursuant to a valid existing

right.”).

Here, that action is the oil and gas development authorized by the SEIS. The inquiry, then, is whether the agency has taken sufficient measures to prevent degradation unnecessary to, or undue in proportion to, the development the proposed action permits. *See Theodore Roosevelt Conservation Partnership*, 661 F.3d at 76. For example, methane waste and pollution may cause “undue” degradation, even if the activity causing the degradation is “necessary.” Where methane waste and pollution is avoidable, even if in the process of avoiding such emissions lessees or operators incur reasonable economic costs that are consistent with conferred lease rights, it is “unnecessary” degradation. 43 U.S.C. § 1732(b).

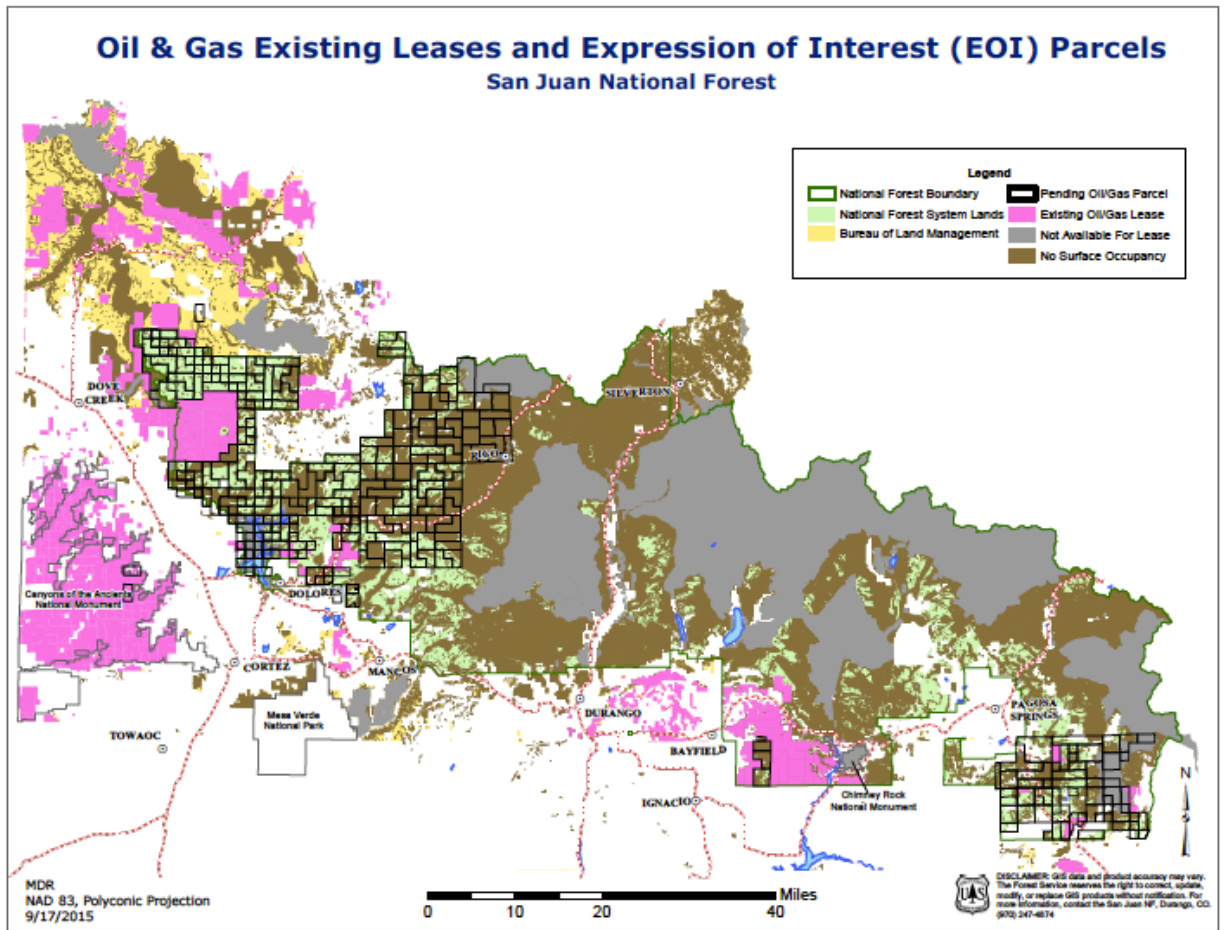
Further, these UUD requirements are distinct from requirements under NEPA. “A finding that there will not be significant impact [under NEPA] does not mean either that the project has been reviewed for unnecessary and undue degradation or that unnecessary or undue degradation will not occur.” *Ctr. for Biological Diversity*, 623 F.3d at 645 (quoting *Kendall's Concerned Area Residents*, 129 I.B.L.A. 130, 140 (1994)). In the instant case, BLM must specifically account for UUD in its NEPA analysis for the SEIS, which is distinct from its compliance under NEPA, and is also actionable on procedural grounds.

#### **VIII. BLM, BIA and SUIT Must Thoroughly Analyze Cumulative Impacts and Reasonable Foreseeable Development**

Certainly the impacts of the field development proposed in this SEIS must be considered in sum with the thousands of existing wells and associated infrastructure across the region, but also in the context of other oil and gas leasing and development scenarios in the planning and anticipated realms at this time. On the Colorado side of the state boundary with New Mexico, hundreds of thousands of acres of deferred and potential (with Expressions of Interests) lease parcels await leasing of which many are beyond the scope of the approximately 3,000 wells indicated in the combined TRFO and San Juan National Forest’s (SJNF) combined Reasonable Foreseeable Development forecast of 2013.

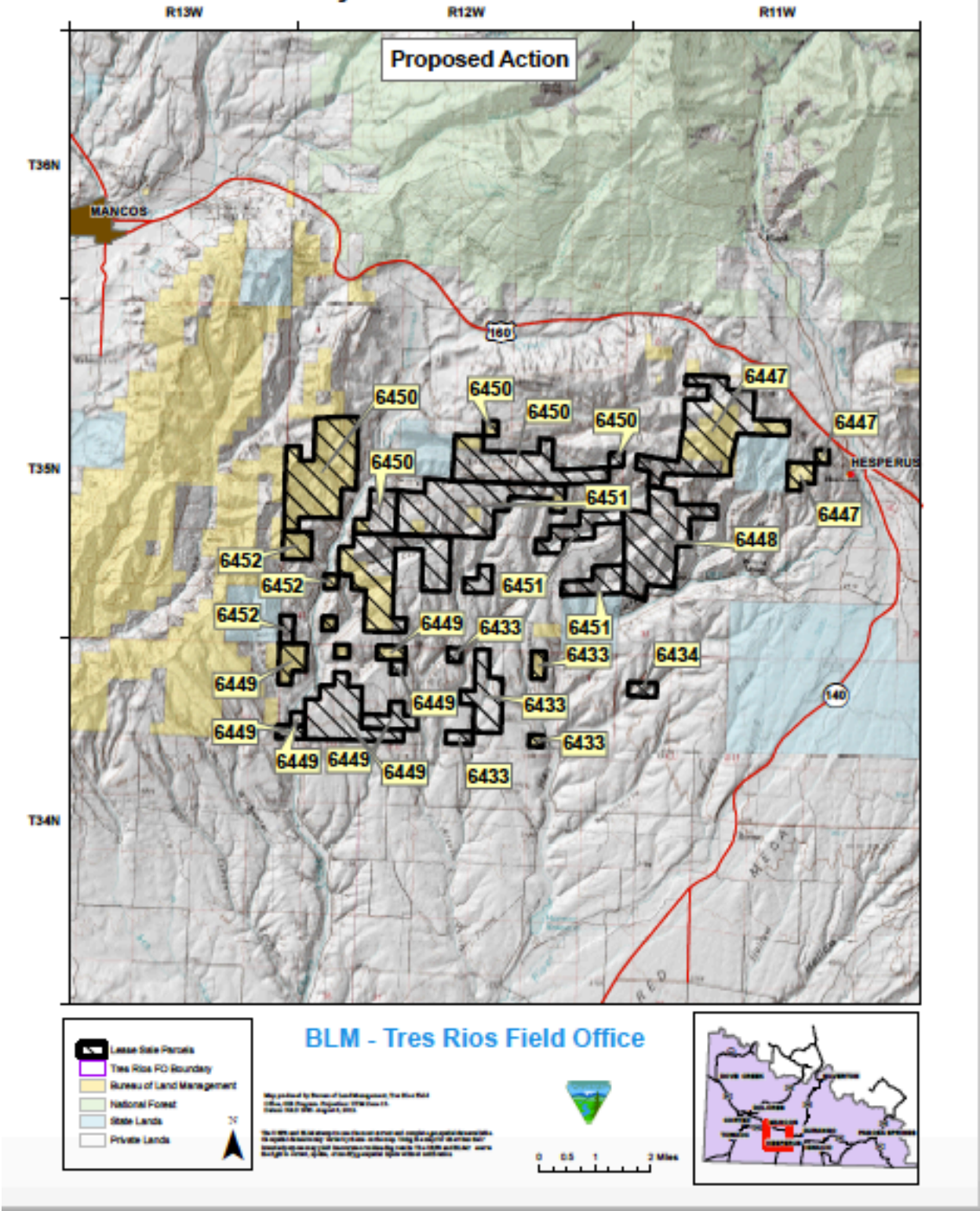
This unknown, but potentially vary large scale of development beyond the SUIT SEIS, is possible due to planned leasing that was recently shared with the public (February 2016) on SJNF lands and consists of approximately 500,000 acres. These planned leases are shown on the map of Oil & Gas Existing Leases and Expression of Interest Parcels 9/17/2015 below:





The TRFO also has deferred thousands of acres of lease parcels from the sales block, such as those of the February 2013 lease sale, in anticipation of their RMP completion in 2015. These February 2013 lease parcels of more than 12,000 acres, as an example, represent possible gas and oil field development **beyond** both the SJNF's EOI parcels of approximately 500,000 acres and the 1,500+ wells proposed in the SUIT SEIS. These February 2013 BLM lease sale parcel of 12,175 acres are located directly adjacent to the far western portion of the SUIT's development interests and represent cumulative impacts related to air and water quality, roads and bridges, wildlife habitat, noise and dust, etc. A map of these deferred leases is included below:

# February 2013 Oil and Gas Lease Sale



## IX. Endangered Species Act Compliance

Congress enacted the ESA in 1973 to provide for the conservation of endangered and threatened fish, wildlife, and plants and their natural habitats. 16 USC § 1531, 1532. To accomplish this purpose, the ESA requires the Secretaries of the Interior and Commerce to determine which species should be added to the list of endangered and threatened species, and to designate “critical habitat” for listed species. *Id.* (citing 16 USC § 1533(a)). The two secretaries generally share responsibilities under the ESA; thus, the Secretary of the Interior acts through the FWS to implement ESA requirements with respect to terrestrial species, and the Secretary of Commerce, through the National Oceanic and Atmospheric Administration’s Fisheries Service (“NOAA Fisheries”), handles responsibilities for marine species. *Id.* at n.32 (citing 16 USC 1532(15) (definition of “Secretary”); 50 CFR § 402.01(b); ESA Consultation Regulations, 51 Fed. Reg. 19926, 19926 (June 3, 1986)).

The ESA imposes substantive and procedural obligations on all federal agencies, including BLM and BIA, with regard to threatened and endangered species and their critical habitat. *Id.* at 35 (citing 16 USC §§ 1536(a)(1), (a)(2), 1538(a)(1), (a)(2); 50 CFR § 402.06(a)). Relevant here is section 7(a)(2), which requires that:

Each federal agency shall, in consultation with and with assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency ... is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat of such species ... 16 USC § 1536(a)(2). The definition of agency “action” is “broad and includes ‘the granting of licenses, contracts, leases, easements, rights-of-way, [or] permits.’” 50 CFR § 402.02 (emphasis added). Thus, “section 7(a)(2) imposes a substantive duty on federal agencies to ensure that none of their actions is likely to jeopardize listed species or destroy or adversely modify the critical habitat of such species.” *Id.* (citing 51 Fed. Reg. at 19926).

The ESA’s implementing regulations set forth a specific process, fulfillment of which is the only means by which an action agency ensures that its affirmative duties under section 7(a)(2) of the ESA are satisfied. 50 CFR § 402.14(a); *Sierra Club v. Babbitt*, 65 F.3d 1502, 1504-05 (9th Cir. 1995). By this process, each federal agency must review its “actions” at “the earliest possible time” to determine whether any action “may affect” listed species or critical habitat in the “action area.” 50 CFR § 402.14. The “action area” is defined to mean all areas that would be “affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.” 50 CFR § 402.02. The term “may affect” is broadly construed by FWS to include “[a]ny possible effect, whether beneficial, benign, adverse, or of an undetermined character,” and is thus easily triggered. 51 Fed. Reg. at 19926. If a “may affect” determination is made, “consultation” is required.

Consultation is a process between the federal agency proposing to take an action (the “action agency”)—here, BLM, BIA and SUIT—and, for activities affecting terrestrial species, USFWS. “Formal consultation” commences with the action agency’s written request for consultation and concludes with USFWS’s issuance of a “biological opinion” (“BiOp”). 50 CFR

§ 402.02. The BiOp issued at the conclusion of formal consultation “states the opinion” of USFWS as to whether the federal action is “likely to jeopardize the continued existence of listed species” or “result in the destruction or adverse modification of critical habitat.” 16 USC § 1536(c)(1); 50 CFR § 402.12(c). Given the new drilling technologies and unique impacts for shale oil and gas drilling (noted chemical, fracking and water issues), potential impacts to Navajo Lake/San Juan River (including Quality Waters fishery) and the recognition of species with the potential for “may affect” and/or “likely to adversely affect” determinations due in part to selenium and mercury issues, BLM, BIA and SUIT should initiate formal Section 7 consultations with USFWS.

Prior to commencing formal consultation, the action agency may prepare a “biological assessment” (“BA”) to “evaluate the potential effects of the action on listed and proposed species and designated and proposed critical habitat” and “determine whether any such species or habitat are likely to be adversely affected by the action.” 50 CFR § 402.12(a). While the action agency is required to use a BA in determining whether to initiate formal consultation, FWS may use the results of a BA in determining whether to request the action agency to initiate formal consultation or in formulating a BiOp. 50 CFR. § 402.12(k)(1), (2). If a BA concludes that the action is “not likely to adversely affect” a listed species, and FWS concurs in writing that is the end of the “informal consultation” process. 50 CFR § 402.13.

Thus, the direct, indirect and cumulative impacts to threatened and endangered species and their critical habitats must be analyzed as a result of the proposed project per compliance requirements with Section 7 of the ESA, 16 USC § 1536 and its implementing regulations at 50 CFR § 402.

## **X. Conclusion**

The Citizen Groups appreciate your consideration of the information and concerns addressed herein. This information is critical and must be reflected in the analysis of the SUIT Shale Oil and Gas Development proposal. Please consider each signee and organization distinct in future communications, notifications and mailings for the NEPA compliance for the proposal concerning Shale Formation Oil and Gas Development on the Southern Ute Reservation in La Plata, Montezuma and Archuleta counties, Colorado.

*s/Mike Eisenfeld*

Mike Eisenfeld  
Energy and Climate Program Manager  
San Juan Citizens Alliance  
1309 East Third Avenue  
PO Box 2461  
Durango, CO 81302  
office: 970.259.3583  
mobile: 505.360.8994

[sanjuancitizens.org](http://sanjuancitizens.org)

mike@sanjuancitizens.org

*s/Jeremy Nichols*

Jeremy Nichols  
Climate and Energy Program Director  
WILDEARTH GUARDIANS  
1536 Wynkoop St., Ste. 301  
Denver, CO 80202  
303.437.7663  
[jnichols@wildearthguardians.org](mailto:jnichols@wildearthguardians.org)

*s/Bruce Baizel*

Bruce Baizel  
Director  
Energy Program, Oil & Gas Accountability Project  
Earthworks  
970-799-3552 (mobile)  
970-259-3353 (office)  
[bruce@earthworksaction.org](mailto:bruce@earthworksaction.org)  
[www.earthworksaction.org](http://www.earthworksaction.org)  
[www.ogap.org](http://www.ogap.org)

*s/Michael Saul*

Michael Saul  
Senior Attorney, Center for Biological Diversity  
1536 Wynkoop Street, Suite 421  
Denver, CO 80202  
[msaul@biologicaldiversity.org](mailto:msaul@biologicaldiversity.org)